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There is a good deal of elementary knowledge as to iron, which needs to be diffused among architects who use it constructively. Were these to apply themselves to a closer study of the qualities of the metal with reference to use, were there more correct calculations as to its supporting strength, more attention paid to diffusion of steam, and proper deductions made for decrease of strength in riveting, were the best forms of girders more closely studied, and other conditions favorable to economy and permanence more fully taken into account, we should witness in iron constructive work, more particularly in buildings, in which it is coming into more extensive use, a material change for the better. With these, as with bridges, allowing that buildings have solid foundations, the worst foe to iron is vibration, and yet we find continuous girders persisted in in spite of the fact that, as compared with non continuous girders, the shocks to the whole are more numerous. In non-continuous girders the vibration spends itself before reaching the extremity, or is subdued by the partial want of continuity. Consequently the life of the continuous girder is the shortest. The latter are certainly cheaper, and on this account recommend themselves to builders, but permanence is to be reckoned as an essential element of economy, and whilst other parts of a building are erected with the utmost regard to solidity it appears ridiculous to look to saving in continuous girders that will be the first to yield. But there are other points apt to be overlooked, and of which we could supply illustrations from buildings being run up in Cleveland. Architects should learn that alterations in foundations which often change the conditions essential to the safe working of continuous girders are less liable to exert their influence on non-continuous girders. Close-spacing of the cross-girders of a bridge increases the number and extent of the vibrations, and has an injurious effect on the girders themselves. The ignorant use of continuous girders may constantly be seen in the construction of warehouses and houses, where no care is taken to space the supports properly, where the quality of iron used is poor, where the margin of safety employed, as found from merchants' lists, is only from 2.7 to 3, and where failure of foundations is probable. In a paper on practical ironwork recently read before the Civil and Mechanical Engineer's Society, England, it was remarked that sufficient care is not taken in the details of ironwork. The points of attachment will generally be found to be the weakest parts; the compression members are considered as being able to bear four tons per square inch, while experiment and theory both seem to show that the strain which wrought-iron columns of the form in which struts are generally made can sustain, more nearly approaches 2.7 tons per square inch of section, and that this value is in many cases too great. The loss from riveting in small girders is greater than is generally allowed for. The present form of upper and lower members in girders might be altered with advantage, vertical plates being used in the tension boom and gusset plates employed for attachment, allowing rivets in double shear. In bridges of small span ordinary lengths and sections of iron should be employed, but in large span bridges, when dead load predominates, greater refinement in designs may be used with advantage.

In response to a number of requests to explain the basic process, from parties interested in, though not connected with, the iron manufacture we now proceed to comply, taking advantage of some details recently published by Mr. E. Windsor Richards on the process as practised at Eston, England. The plan of operation is exceedingly simple. The converter is first heated up with coke so as to prevent the chilling of the metal. Then a measured quantity of well burnt lime, about 16 per cent of the weight of molten metal, mixed with a small quantity of coal or coke, is charged into the converter, and blown till the lime is well heated. The molten metal is then poured on the lime additions, the blast of 25 lbs. pressure is turned and the carbon lines disappear in about ten minutes; then after about two and a half minutes over-blow the converter is turned down, and a small sample just made, which is quickly beaten into a thin sheet under a small steam hammer, is cooled in water, broken in two pieces, and the fracture shows to the experienced eye whether the metal is sufficiently ductile. If it is not so, then the blowing is prolonged, after which the spiegel is added and is poured into the ladle, not into the converter. During the operation of blowing the lime and metal are lifted by the force of the blast, and when that force is somewhat expended the materials fall again on to the bottom. The result of the process is the making a mottled iron with but a trace of silicon and sulphur, also a white iron which has still less of the former. For the basic process the initial bath should be low in silicon, because silicon fluxes and destroys the lining, and causes waste of metal; it should be low in sulphur so that the metal may not be red-short. Nearly one-half the sulphur is eliminated by the basic process. In order to work economically, the metal is taken direct from the blast furnace so as to avoid—first, the cost of remelting in a cupola; and, second, to avoid further contact of the metal with the sulphur and impurities of the coke. It is not an easy matter to accomplish in a blast furnace the manufacture of a metal low in silicon and at the same time low in sulphur. It would, no doubt, very much help to keep sulphur low if manganese was added in the blast furnace, but manganese is a costly metal. To vary, according to choice, the particular quality of pig iron, a second mode of working is introduced called the transfer system, because the metal is transferred from the acid to the basic converter. The transfer system makes it possible to take any gray iron direct from the blast furnace to the converter without any consideration as to the percentage of sulphur, which is always low in gray iron. This gray metal is poured into a converter with a silicious lining and desiliconized, when, after, say 12 or 15 minutes' blowing in the ordinary manner, it is poured out of the converter into the ladle, and poured again from the ladle into a converter lined with dolomite, taking care that the highly silicious slag is prevented from entering the basic-lined converter. Then in the second converter it is only necessary to add sufficient lime for the absorption of the phosphorus of the metal, and the blowing then need not occupy more time than is necessary for the elimination of the phosphorus—say about three minutes.

The money market is somewhat easier. Bank statements show an increased outgo of National bank currency, decreasing the surplus reserve. Foreign exchanges are in a critical condition. Gold shipments to this country have been prevented the past two weeks by means of borrowed sixty days sterling, and hope is expressed that before pay day exports, either of securities or merchandise, will be found to meet the borrowed bills. But what is the position of our foreign trade? For February of this year the value of the merchandise imported exceeded the value of merchandise exported by $2,381,629 (a rare occurrence), against an excess of $19,974,314 in the exports for February, 1881. For the eight months ended February 28 the value of the merchandise imported was $50,273,009 greater than for the same time in the preceding yenr, and the value of the exports was $80,283,688 less, making a difference against the country for the eight months of $139,556,697. The canal business has fallen off; and lake and ocean freights have declined, which facts are by no means good auguries. The dulness of the metal trade in most of its branches is patent, In the iron trade concessions have become the rule. Part of the lull is attributable to excees of production in many departments of labor; and a reaction on speculation which had increased more than the business which represents transfers of actual products. Improved activity is, however, generally looked to as the season advances.

The Massachusetts Labor Bureau have somewhat offended the manufacturers of Fall River by adverting to the elements of discontent that there exist as compared with Lowell and Lawrence, and noting as one cause fertile of labor troubles the absence of the same spirit of good feeling between masters and operatives at Fall River that is found in the two other localities. Since their report was written, however, there has been a strike at the Lawrence mills, which weakens the contrast established. There is a difference, however, between a chronic state of discontent and occasional uprisings, and we refer to the matter to cite the following entertaining and pungent historical and philosophic remarks of our able contemporary, the *Boston Commercial Bulletin*: "Unsatisfactory as some things are at Fall River, they are not unnatural. Lowell and Lawrence grew slowly; changes have been gradual, and labor and capital have adjusted themselves without violence. Fall River's growth was the result of an abnormal demand, and was itself abnormal. Its men, like its machinery, were imported. Scarcely a single moral element entered into the situation; everything was material. There has been no chord of sympathy across the chasm that naturally separates employers and employes. This chasm exists everywhere and always; the presence of a bond of sympathy across it means industrial peace; its absence means industrial war, and this is essentially the difference between Fall River and its sister cities." In short, it would seem that there is a repetition at Fall River of much the same habits of feeling that exist in England between masters and men, where ancient prejudices and conventional views of relative position too strongly assert themselves. One patent reason why France so prospers industrially is the general hearty co-operation between artisans and their employers. Any sug-

gestions of improvements from the latter in the way of manipulation, machinery, &c., are encouraged and rewarded, and both parties are gainers by mutual good will and confidence. Undoubtedly general good feeling between operatives and their employers is the best preparative for the settlement of differences when these occur.

In a paper read by Prof. R. H. Thurston, before the Stevens' Institute of Technology, on steam engineering, in which the loss of power by conductibility of metallic cylinders is set forth, he makes the bold but sagacious remark that it is surprising that a non-conducting *substitute* for metal has not long since been found. In this inventive age everything that is required would seem to come in time, but as in the case of the Chinaman who made a rifle of silk, the question of cost and sufficiency of supply of the material has to be considered. At present engineers must be content, for the most part, to put up with steam jacketing, and a moderate degree of superheating. What is really required is a non-conducting lining for cylinders, and a huge fortune lies in the discovery. Professor Thurston observes that the use of a highly conducting material for steam cylinders so influences the behavior of steam by causing condensation when the steam is entering and cooling it during expansion, that the greatest efficiency of the ordinary engine is usually found when the ratio of expansion is equal to about one-half of the square root of the boiler's pressure. This, however, must not be taken absolutely, and irrespective of modifying conditions, pressures being affected by different points of cut-off, by differences in the initial temperatures, and pressures and quantities of water present. Sufficient investigations have been made as to the cut-off to determine approximately its last position; as long, however, as cylinders must be used with high conducting power, complications will be introduced into the action of steam, rendering a great loss of power unavoidable, and interfering with the efficiency of the best devised engines. Steam is always more or less condensed at the beginning of the stroke, and carries away heat by its evaporation. There is needed to put steam to full account the supply of latent heat expansion at a constant temperature, and this may ultimately be realized. The approximation so far is best attained by the use of superheated steam.

ONE of the inconveniences of the telephone has hitherto been the necessity of the speaker having to rise to apply his mouth to the tube, and await there the answer. As will be seen by reference to our columns, the means have been found of rendering the voice proceeding from the instrument audible in any portion of a room, an immense gain to comfort and convenience. As the invention is in the possession of the Bell Telephone Company, which controls all the telephones of the United States, we may look to its general introduction at an early period. A leading New York electrician, previously not conversant with the invention, was startled in the Boston offices of the company by hearing as he sat in an easy chair, away from the mouthpiece, an enquiry from a Manhattan acquaintance as to his health.

The canning business in Ohio products is a large and growing one, and this gives occasion to the production of tens of thousands of tin cans yearly in this and other manufacturing centers. The division of labor in the can making business accounts for the general accuracy of the work, the breaking the bundles of tin plates, the cutting, punching, twisting and soldering up the parts of cans, with the after process of cleansing and polishing and soldering up the orifices, being assigned to different hands. The tinner's department of a canning establishment is an interesting hive of industry. One of our largest factories propose to make 500,000 cans this season. Such is the finish given to the cans, notwithstanding the rapidity of operations, that we understand those rejected as leaky do not exceed five in a thousand.

WHEN the mechanical mind gets irate, look out for a blizzard. Our excellent contemporary, the *Mechanical Engineer* of New York, complains in a most discourteous spirit, of the color of our cover, declaring that this is so *nearly like* its own that it is difficult to tell the two journals *apart*. Neither journal can be said to depend upon color for reputation or circulation, and some corrective to misapprehension might certainly be found in our larger size and in the widely different titles, not to speak of contents. French scientists enumerate no less than 6000 variations of tints, thus affording apparently a wide range of choice, but nothing like this number of samples was submitted to our inspection, and we selected off-hand what appeared best suited for a first trial. Every journal possesses such distinctive features, that discrimination in color is wholly unnecessary. Our contemporary, in its bitterness, refers us to one of Œsop's fables (apparently to indicate its exclusive proprietorship of its own hue,) instead of sending us to the fable alone capable of consoling us under its reproach,—that which shows the impossibility of pleasing every one. We are always ready to receive practical suggestions, and as soon as our present large stock of cover paper is worked off, will probably select a warmer color, with a more decided tone.

INDIVIDUAL owners and joint stock owners of vessels employed in coasting and on our inland waters reasonably seek to be relieved from their present extent of personal liability. Mr. Townsend has introduced in the House of Representatives a bill which in one clause provides for the release of owners of domestic vessels from personal liability beyond an amount equal to double the amount of their respective investments therein. The measure is sufficiently important to be embodied in a separate bill, but unfortunately the bill in which it finds place is for a wholly different object.

THE agreement come to in New York by which the Mutual Union telegraph lines will be operated entirely in the interest of the Western Union Company is far from being a cause of congratulation to the general public, who had hoped for a healthful competition between the two corporations. This concentration of power in the hands of Jay Gould is not likely to be long tolerated by the country, which is certain at no distant time to urge the purchase and control by the Government, as part of its postal system, of the entire telegraph lines of the United States.

ALTHOUGH the vessels employed in the domestic commerce of the United States on the seaboard and on the interior waterways of the country do not come into competition with foreign vessels, the curious fact appears that their gross tonnage has not materially increased the past ten years. This is owing to the circumstance that they have to compete with the railways, whose facilities of transportation better suits the demands of commerce. In the past ten years the number of our freight cars has increased nearly 120.60 per cent., and the number of passenger cars 65.08 per cent.

THIS is the day of large machines. An exceptionally powerful slotting machine, especially designed for marine engine work, has recently been completed by Messrs. Craven Brothers, of Manchester, England. The total weight of the machine is 70 tons, and the maximum stroke of ram is 10 feet, with a minimum stroke of 9 inches. The distance from the face of the ram to the frame is 6 feet 6 inches, and the total height from ground line, when working its longest stroke, is 30 feet. The machine can be worked at equal speed in the cutting and return strokes, or the return stroke may be accelerated to double that of the cutting stroke when the work will admit. The self-acting motions are all variable from four to sixty-four cuts per inch, and besides these, the slides and rotary table can be moved in either direction by power, at the rate of eight feet per minute.

THE question as to the comparative cost of the electric light and coal gas is of general interest. Mr. Swan, the inventor of an incandescent electric lamp very similar to Mr. Edison's light, recently gave some particulars before the London Royal Institution as to the comparative cost of incandescent light and gas. He said the cost of light by electric incandescence might be compared with the cost of gas-light in this way: Two hundred weight of coal produced 1000 cubic feet of gas, and this quantity of gas, of the quality called fifteen-candle gas, would produce 3000 candle-light for one hour. But beside the product of gas, the coal yielded certain by-products of almost equal value. He would therefore take it that they had in effect 1000 feet of gas from one hundredweight of coal, instead of from two, as was actually the case. The one hundredweight of coal would give fifty horse power for one hour. Experiments showed that they could obtain through the medium of incandescent lamps at least 200 candle light per horse power per hour. But as there was waste in the conversion of motive power into electricity, and also in the conducting wires, he made a liberal deduction of 25 per cent, and took only 150 candle light as the net available power of one horse-power. For fifty horse-power, the product of one hundredweight of coal, they had then 7,500 candle-light as against 3000 candle light from 1000 feet of gas. There remained, however, an allowance to be made to cover the cost of the renewal of lamps. Whether by the method of multiple arc, which required the multiplication of electrical stations, or by means of the simple series of secondary batteries connected with with each other from house to house in single series, the lamps being fed from these in multiple arc, he was satisfied that comparatively with the cost of gas the distribution of electricity was sufficiently economical to permit of its practical application on a large scale.

MANUFACTURES.

TO MACHINISTS. MANUFACTURERS AND OTHERS.

THE publishers of THE TRADE REVIEW solicit items of information concerning manufacturing and other establishments in any part of the country, and all such items will be promptly inserted in these columns, free of charge. Facts are the only things needed; and all communications should be accompanied with the name of the contributor—not for publication—but as a guarantee of good faith.

Manufacturers, machinist and engineers are particularly requested to communicate any matters of interest relating to their specialties. No one need be deterred from sending any interesting facts in his own language, as all such contributions will be properly revised befor sendin to press.

OHIO INDUSTRIES.

THE Himrod Furnace, Youngstown, has been blown in.

THE Bellaire Goblet Co. are about to enlarge their store room.

THE Perry Stone Co., of Salem, have commenced moving to mansfield.

THE Canton Car Company expect to turn out 10 box cars a day.

IRON will be turned out at the new sheet mill in Struthers by the 1st of May.

THE Ohio nail manufacturers report a steady demand for all they produce.

AT the Bellaire Nail Works additional machinery has been put in.

A LARGE addition is to be made to the moulding shop of Aultman, Miller & Co., Akron.

THE Youngstown Car Works will probably be enlarged this season.

KIRK & DIEHL'S new saw-mill, Ellsworth, has gone into operation, and works admirably.

THE Ironton Hoe and Tool Works have been incorporated with a capital stock of $25,000.

HECLA Furnace blew out on the 1st inst. to await new stock of coal, and will resume early in May.

MR. JOHN PRICE, Cleveland, is manufacturing prepared paints at the rate of 2,000 gallons per day.

JEWETT Bros., Akron, will manufacture the brick for the new Akron-Portage Straw Board Works.

THE Rigby Car Wheel Company of Cleveland, has been incorporated with a capital stock of $500,000.

WORKMEN are engaged in erecting the McDonald shield at the puddling furnaces in the mills of Brown, Bonnell & Co.

THE Cincinnati Type Foundry, and the Gerke Brewing Co., Cincinnati, have set their boilers with the Jarvis patent furnace.

IN view of the building of the Dresden branch there is serious talk of locating the shops of the C., A. & C. Railroad at Millersburg.

THE enterprising Beacon Co., Akron, has ordered a double cylinder Hoe press and a new dress of type for their flourishing daily.

THE North Carolina Car Company has been organized in Raleigh for the purpose of building freight cars. Capital $50,000.

MOORE, Jones & Co., St. Louis, manufacturers of car and engine brasses, intend doubling the capacity of their extensive works.

THE forge shop of the Cole manufacturing company, Lake Village, N. H., is in operation night and day, turning out car axles.

COPE & MAXWELL Manufacturing Co., of Hamilton, manufacturers of steam pumps and water works machinery, have some 120 hands employed.

THE Malleable Iron Works, Youngstown, had recently an order from an agricultural works in Canada for 333,000 pieces. It will take fully six months to fill the order.

THE White Sewing Machine Company, Cleveland, receive 1,000 sewing machine crates a week from the planing mill and box factory of B. H. Briscoe & Co., Bay City, Mich.

L. STREHA & Son, of Pittsburgh, will build a glass tableware manufactory in Massillon at an enpense of about $29,000, provided the land and $6,000 are donated to them.

ANOTHER new enterprise is on foot at Peninsula, that of the manufacture and sale of gasoline stoves. The firm consists of Dr. A. M. Cole, L. Beers and W. W. Whitney, of whom Dr. Cole will be selling agent.

THE Queen City Machine works, Cincinnati, have just been established for the manufacture of lathes, pulleys and machinist's tools, the proprietors being Messrs. Reinshagen & Buckman. A specialty will be brass goods.

CORSER & Runyan, manufacturers of picture frames, black walnut brackets, and fancy cabinet ware, 146 Mill street, Rochester, N. Y., employ 24 hands. They were established in 1862. Business with them is very good.

THE Diebold Safe & Lock Co., Canton, have about 400 hands employed, and are adding 100x60 two-story brick to main building with some $5,000 worth of new machinery. They have under construction a large deposit vault for the First National Bank of Chicago, and another for the Safety and Security Deposit Co., of Buffalo, N. Y.

THE property known as the Thompson property, Cuyahoga Falls, has been finally purchased by the firm of Loeser & Mahler, they paying therefor $14,050. Mr. Israel James will hold the position of foreman of the forge and Mr. Ostrander of the rolling mill. Loeser & Mahler will expend $5,000 in repairs. The forge will be used principally in the manufacture of axles and the rolling mill in making all kinds of rolled iron.

THE works of the National Machinery Company, Bond & Rockwell street, Cleveland, have been furnished with the Brush electric light. The works are running night and day.

THE Cleveland File Company, Cleveland, has been incorporated, with a stock capital of $10,000; also, the Mansfield, Bolt and Nut Company, Mansfield, with a stock capital of $30,000.

AMONG coming erections at Martin's Ferry are the Standard Iron Company's sheet mill, a new stove foundry, one new glass factory, besides buildings for several minor undertakings.

THE foreign firm, which has established the manufacture of chairs at Peninsula is about to connect with this enterprise the manufacture of wooden bedsteads under a valuable patent. These beds can be taken in a few moments to pieces and compactly shipped.—*Beacon.*

S. C. MCNEIL, Peninsula, has gone into partnership with A. R. Cassidy in his eheese factory business, which has grown to large proportions. The factories now under their control are as follows: The Cassidy factory, near Patrick Cassidy's; the Oak Hill factory; the Boston Union factory; on the line between Boston and Richfield; the factory at Richmond Center. Besides these they are in treaty for the Frank Welton factory at Hammond's Corners, and the John Weston factory at Hawkins' Station.—*Beacon.*

THE pipe mill of Reichelt, Sandford & Company, Chicago, produces 200 tons of piping, from $\frac{1}{8}$ to 2 inches inclusive, every month, besides turning out special size of coils and pipes for heating and ice machine purposes. The company have recently enlarged their works and are furnishing employment to 55 men.——M. C. Bullock, Chicago, has just shipped the last of a complete outfit of engines, boilers, machinery and Brush Electric plant for lighting an entire town, amounting in all to nearly $50,000.—*Indust. World.*

THE syndicate of capitalists known as the Standard Coal and Iron Company has accepted so much of the property and plant of the Akron Iron Company as lies in the Hocking Valley, the price to be paid being $825,000. The Akron Iron Company's property consists of a furnace, about 1,339 acres of iron and coal lands, and the town site of Buchtel. The sum of $200,000 will be paid down; the rest in 90 days. As we have stated, the object of this syndicate is to buy up and control a large part of the mineral lands of the Hocking Valley and contiguous territory. It will control in all some 40,000 acres of land and 13 furnaces, and with a capital of $2,500,000 it can make further improvements in the way of building railroads, etc.

David and C. H. Spaulding, long at the head of the Jefferson Iron Works, are taking the preliminary steps toward the formation of a company with a capital of $350,000 for the development of coal lands and building of a large rolling mill and nail factory at Brilliant, on the river and the Cleveland and Pittsburgh railroad, seven miles below Steubenville. They have already there 500 acres of coal land, with a five-foot vein of the same general character as the Steubenville coal, 20 acres of surface, and a shaft, with all the facilities for hoisting, &c., and supplying all the coal needed. We understand that this property will be put into the concern at $75,000, and that the Messrs. Spaulding will make a cash subscription of $100,000 additional, thus taking half the entire stock.

THE iron industry of the Hanging Rock Region in Ohio began in 1826, and Hanging Rock, a point three miles below the present site of Ironton, was the centre of it till 1850. In the meantime nine furnaces were constructed in the county—Lawrence—and the problem of how to get the products to the river resolved itself into a project to build a railroad, and locate a town at the river terminus. That town is now called Ironton, which, in 1850, had no population whatever. In 1860, the population had increased to 3,700; in 1870, to 5,680; and now it is nearly 10,000. The iron industry is the basis of Ironton's growth. It is the geographical and commercial centre of the Hanging Rock iron region. Sixteen furnaces, two rolling mills, one nail works, a hoe works, two machine shops and two foundries, transact their business and sell their products at this point. The business of these institutions is over $4,000,000 annually at present prices. The product distributed is as follows: 35,000 tons of charcoal metal; 62,000 tons of coke and stonecoal pig iron; 20,000 tons of bar and sheet; 240,000 kegs of nails, and 10,000 tons of castings and stoves. This statement includes nothing but the iron product, which is sent forth to market. In turning out this product, it requires the handling or moving of 225,000 tons of iron ore, 80,000 tons of limestone, 90,000 tons of coke, and 4,000,000 bushels of charcoal. All this work is done at or near Ironton, and a population of nearly 20,000 people live upon the labor directly connected with the handling of this material. When the iron market is somewhat brisk, and all the works are running to full capacity, there are paid out in Ironton and at the furnaces tributary thereto upwards of $3,000,000 annually for labor directly employed upon the iron product. The material and labor, except the coke for four furnaces, are procured and employed within the limits of Lawrence county. Of the furnaces, four coke (or coal) and one charcoal, are located in Ironton or the suburbs. The remaining ten are located from three to twenty miles distant. With most of these the iron railroad connects.

INDUSTRIES IN GENERAL.

THE iron foundry to be erected for Messrs. Walker & Atwood, at Brockton, Mass., will be begun at once. It is to be conducted by a stock company, and the capital stock is already taken.

THE McQueen Locomotive Works, of Schenectady, N. Y., have filed articles of incorporation, with a capital stock of $300,000. The works are to be located near the crossings of the New York Central and Delaware & Hudson Canal Co.'s tracks.

A FACTORY for the manufacture of albumen, made chiefly from the spawn of fish, and used for the purpose of obtaining fast colors, is to be established in Barnstable, Mass. New York parties are interested in the enterprise.

A FACTORY for the manufacture of furniture veneering from gum wood, so abundant in almost all sections of the South and Southwest, has been erected at Poplar Bluff, Mo., on the line of the St. Louis & Iron Mountain Railroad. The grain of this wood is said to be very fine, and when polished, remarkably beautiful.

IT is fifteen years since the first aniline color was produced in this country. The aniline works of Messrs. Holiday, Brooklyn, N. Y., employ between twenty and thirty men, and are turning out scarlets, browns, violets and oranges, and this and the establishment at Albany, which produces magentas, are the only aniline works in America.

THE Lehigh Manufacturing Company, Bethlehem, Pa., are making a specialty of scoops adapted to a variety of uses, and owing to the increased demand the company have been compelled to materially improve their capacity. They now have a cluster of seven buildings, making a very complete and most extensive manufacturing establishment. Besides scoops, they manufacture shovels and spades, and large numbers of hoes for the Southern market. They also manufacture their celebrated patent spring wagon gears, which are being used extensively throughout the United States.—*Industrial World.*

THE little village of Dolgeville, Herkimer county, N. Y., nestled among the hills that skirt the North Woods, has the only manufactory of sounding boards in the world, and the only factory for making piano felts in this country. The work gives employment to 480 people. When the piano felt factory was brought there, in 1874, the village contained less than one hundred inhabitants, and the single tannery that alone had utilized the stream, which has an unfailing current of 6,000 horse power, had long ceased operations. Five years ago every piano firm manufactured its own sounding boards, and the attempt on the part of a single firm to suit the tastes of all piano men was regarded as an innovation that would never succeed. Now the boards are shipped in large quantities to European countries, and the domestic demand keeps ahead of the supply. Last year 52,000 sounding boards were made and sold.

MOST of the companies on Menominee river, in Wisconsin, have put in enough logs to last them through the sawing season with the aid of the old logs left over from last year. Probably 240,000,000 feet of logs have been put into the river this winter, and there were about 40,000,000 left over, so that there is now on hand and available for the summer's sawing at least 275,000,000 feet.

MECHANICAL RECEIPTS AND ITEMS.

PREVENTING RUST.—Rust may be prevented by the application of lard and resin, it is said, to all steel or iron implements. Take three times as much lard as resin, and melt them together. This can be applied with a brush or cloth to all surfaces in danger of rusting, and they can easily be kept bright. It can be kept for a long time, and should always be on hand and ready for use.

TO BRONZE IRON.—Iron has sometimes to be bronzed for domestic use. The following is a very simple way of obtaining a very good bronze: Mix an equal quantity of butter of antimony and oil of olives; put this mixture on the iron which is required to be bronzed with a brush, the iron having been previously brightened with emery and cloth, and leave it for several hours. Then rub with wax and varnish with copal.

MECHANICAL REMOVAL OF INCRUSTATIONS FROM WATER PIPES.—Mr. E. H. Keating, city engineer of Halifax, has constructed new scraping machines for removal of incrustations from pipes, which differ from those formerly invented by him in having additional springs for the cutters and the pistons. These scrapers consist of an iron rod to which are attached two pistons and two sets of cutting tools, one in front of the other. The cutters are each made up of four strips of steel, 2½ inches broad, sloping backward from the rod, and at their outer terminations shaped and sharpened like the barbs of an arrow. Thus they can yield when requisite, and the cutting diameter can be altered by moving the steel strips. The pistons are of iron, lead and leather, to which Mr. Keating adds rubber springs. With this apparatus and with the ordinary head in the pipes, lengths of 24, 20, 15, and 11-inch pipes have been cleaned at a total cost of 2 8-10 cents per foot.

NEW REVOLUTION INDICATOR FOR ENGINES.—A wheel on the registering device is driven by connection with the engine. A graduated index wheel is placed upon the same shaft and held from motion by detents, and is attached to the shaft by coiled springs, which are wound up by the revolution of the driven wheel, an electric connection with a clock causing this wheel to be released with a short interval between them. At the expiration of each minute the graduated wheel on being released is forced by the action of its spring to follow up and overtake the driven wheel, and for a moment presents through a slot in the index wheel an indication of the revolutions made by the engine during the preceding minute.

TEMPER OF STEEL.—The temper of steel is due to the chemical union of iron with the carbon. At low temperatures this union takes place only in a slight degree, and hence in soft steel we have the carbon keeping aloof from the iron; but as the temperature is raised the combination is furthered, until in the case of gray or glass hard steel we have really a kind of diamond alloyed with iron. Sudden cooling is necessary to fix the combination, for in slow cooling the carbon separates out again from the iron. This view is supported by a variety of facts; Mr. Stroh, for example, having observed that when an electric spark passes between two iron contact pieces and fuses them, the fused part becomes diamond hard and will scratch a file. Recent researches by Mr. T. W. Hogg have also led him to a similar conclusion—namely, the temper of steel is due to the presence of an unstable compound of iron and carbon. The color of the surface of tempered steel depends on the temperature, and is due to the thickness of the film or skin of oxide; the blue film signifying a higher temperature than the yellow, as well as a thicker coating. In this connection Prof. Hughes has demonstrated that the electric resistance of the film increases with the temperature. A novel illustration of metallic skins was furnished by Prof. Guthrie, who exhibited a steel chain to which he had given a beautiful bluish-black protective coating by simply dipping it in melted nitrate of potash or common nitre. The process was discovered accidentally, and as the bloom improves the appearance of the metal it will probably be applied to utensils of iron and fancy articles.

A STOCK company has been formed at Meriden, Conn., for the manufacture of Russian and Swiss chime sleigh bells and saddlery hardware, Mr. E. A. Chapman having moved his works there from Middletown.

Rustless Iron.

One of the most important discoveries that has been developed during the present century is that of coating iron for the purpose of preventing corrosion, and rendering the most useful of all metals practicably indestructible. When we consider what an important factor is iron in almost every branch of industry, and how much we depend upon this metal for innumerable requirements, the means for its preservation cannot fail to be regarded with great interest. Rust is the great destroyer; therefore in rendering iron rustless a great and commercially important problem has been solved. About six years ago, Professor Barff made known his process for protecting iron surfaces from rust by coating them with magnetic oxides, and subsequently George Bowen, of St. Neots, the well known gas and water engineer, revived a process discovered by him some years previously. Mr. Bowen patented his invention, and afterwards made several discoveries, which he also protected, each one being an improvement on its predecessor; thus most valuable results have been attained, tending to preserve iron and render it rustless. Both Professor Barff and Mr. Bowen claimed the same results, yet the processes are, we understand "practically and judicially distinct;" although both have the same object in view. By means of Professor Barff's rustless process, tubes and fittings are effectually protected, and the method has been most successful in practical operation. Professor Barff's original method has been found especially adaptable for wrought iron. The Bowen process for coating iron—more particularly cast-iron and steel—with magnetic oxide, consists of two operations. 1st, the admission of atmospheric air to the furnace which oxidizes the metal; 2d, the admixture of the products of combustion of fuel, and at times, if required, of gas from oil, to de-oxidize, or rather convert, the sesqui-oxide of iron into the magnetic oxide. This oxide, when it is met with in its natural state, is the lodestone of commerce. The first part of the process produces rust or its equivalent, the second the transformation of this rust into a coating of impervious magnetic oxide. This is the general description of the chemical changes which the surface of iron undergoes, but the exact composition of magnetic iron has not been quite decided. The working of the oxidizing and de-oxidizing process is exceedingly simple. The goods, consisting of weights, half-hundred weights, stove castings, ornamental and fine art castings, are placed in an oven capable of holding about one ton, though, of course, there is no limit to the size of the castings which can be operated on, except of the furnace. Air, at a high temperature, is then admitted to the castings, and after a time carbonic oxide, evolved either from the cumbustion of the fuel, or from a gas-producer somewhat on the Siemens principle, in combination with the furnace. The admission of either atmospheric air or carbonic acid is, of course, under perfect control, and the best results are obtained by admitting the air and gas alternately at regular intervals during the process, which usually occupies from eight to ten hours, and the result can be always relied upon to a certainty; for, notwithstanding the enormous amount of care, skill and scientific experimenting which was involved in perfecting the process and making it a reliable mechanical operation, it can be carried on now by a comparatively unskilled workman, as the only extra work which the attendant has to do is to regulate the supply of gas and air at intervals, and this is done by merely turning a handle. Hence the Bowen Barff process has almost attained the perfection of scientific mechanism, as the results are certain and the action simple. One of the most valuable features of Mr. Bowen's system is that the rust on iron surfaces can be converted into magnetic oxide. Any iron or steel, therefore, that has become damaged or unsaleable by exposure, such as, for instance, tubes, pipes, gas standards, brackets, pillars, rails and ornamental work—can be restored permanently to their original beauty, no matter how thick the incrustation of rust may have been, since the sesqui-oxide of iron is converted into the magnetic, and hence the goods are eventually improved instead of being deteriorated by the rust. The value of this part of the process will be appreciated by those who have to keep iron stocks of any kind. The cost of the Bowen-Barff system does not involve any considerable expenditure, while the invention must be regarded as one of the most valuable ever discovered. For specimens of iron coated by the Bowen-Barff process several prizes have been awarded, including a gold medal for the exhibit at Melbourne last year.—*British Trade Journal.*

Engine Economy and Economical Engines.

A wide difference exists between the two conditions above named, although they are sometimes used in a sense which makes them seem to have the same value. An engine may be economical in its place, and for a certain duty, but if it is taken out and put to other work it will be found wasteful. Engine economy depends wholly upon, and has reference to, the kind and amount of work it is doing. A case in point occurs to us, which came under our observation a few months ago. A person had a large engine set up in a building where but little work was required of it. It was rated at 60-horse power, but the needs of the place were only about five. It was the practice of the engineer in charge to carry high pressure and cut off short, so that at the end of the stroke the card showed a back pressure of about seven pounds, if our information is correct. The expansion curve went much below the vacuum line and formed a loop, for the work on the engine was but little more than a mere friction diagram would show. This was no fault of the engine itself, as it was capable of very good performance under proper conditions, but it was an error in judgment of the builder in putting in such an engine for so slight a duty. The engine was economical enough, so far as its adjustment and design were concerned, but there was no economy, but extravagance, in using a 60 horse engine to do 5-horse duty. This is a mistake not unfrequently committed by persons who buy machinery and fit up factories regardless of anything but mere guesses at how much power will be needed. Engineers of experience should be consulted on such matters if parties wish to avoid expense. It is much better economy to put in an engine suited for the present work and enlarge it when the time arrives, than to put in a big engine and boiler that are not worked up to half their capacity, with the expectation that it will be needed in the future.—*The Mechanical Engineer.*

The Latest in Telephones.

A great advance has been made in the telephone, by which the voice is heard distinctly many feet away from the speaking tube. Mr. C. E. Chinnock, electrician of the Metropolitan Telephone Company, on visiting the quarters of the Bell Telephone Company, Boston, states that he was surprised whilst sitting in the office to hear distinct inquiries addressed to him from New York. He adds: By a chemical manipulation of the carbon, which is still a secret, and the use of a current four times as strong as the ordinary one, our telephones, as we call them, can be made to give forth sounds as loud and articulate as the human voice itself. It is no exaggeration to say that after this improvement is put to use the call bell will be wholly unnecessary, because the voice from the telephone will be heard by any one near enough to hear the bell. Tuus, while I was still in the room a voice came from the telephone calling Miss Taylor—some one employed in an adjoining room, and sitting at least forty feet away from the instrument. But the door was open, and she heard the call and came in to answer it. By using what is known as metallic circuit—two wires instead of one—conversations have been carried on between New York and San Francisco, and I have no hesitation in saying that within a year conversation between here and Chicago will be a matter of hourly occurrence. No change whatever will be necessary in the present apparatus, except in substituting four cells for one, and a differently prepared carbon."

"What Alexander Might Have Done."

The late Czar of Russia was eminently a great man, as his action in liberating thirty-six million of serfs from slavery qualified him to be. Yet with all his greatness, Alexander left it to Dr. Swayne to liberate the world from the annoyance and pain of scores of skin diseases, by producing Swayne's Ointment. Think of the tens, hundreds, thousands it has cured, and then remember it is economical, effective, reliable and pure, and if you will only try it you will have a cure.

THE practical $5 Standard Electric Belt advertised in this paper should not be confounded with other electric goods.

MISCELLANEOUS RECEIPTS.

To Bend a Wrought Iron Pipe.—To bend a wrought iron pipe fill it with resin. When the resin hardens bend the pipe, and it will retain its round form. Remove the resin by heating.

To Use Old White Lead Paint.—Break up the hardened paint and triturate it in a mortar (or paint mill) with just enough hot linseed oil to soften it properly, then thin down with oil of turpentine.

To Make Stencil Ink.—A good and cheap stencil ink in cakes is said to be obtained by mixing lamp-black with fine clay, a little gum arabic or dextrine, and enough water to bring the whole to a satisfactory consistency.

New Alloy for Sockets, etc.—The following composition is said to have been invented by a chemist named Hoyle: Tin 24 parts; lead 32 parts; antimony 6 parts. The alloy, it is estimated, will stand a great amount of friction without becoming hot.

Coating of Brass.—Black is much used for optical brass work, and is obtained by coating the brass with a solution of platinum, or with chloride of gold mixed with nitrate of tin. The Japanese bronze their brass by boiling it in a solution of sulphate of copper, alum and verdigris.

To Temper Dies.—To temper large curved dies for cutting iron and steel plate, fill the holes with fire clay and wire to keep them in place. Heat even ly and slowly in a furnace. Lift the dies from the furnace with the face vertical, and plunge vertical into water heated to about 50 degrees and containing about ½ pounds salt per gallon. Hold them still at the bottom of the water until cooled.

Oil on Woodwork.—Carefully conducted experiments have demonstrated the fact that seasoned wood, well saturated with oil when put together, will not shrink in the dryest weather. Wheels have been known to run many years, even to wearing out the tires. Very many dollars might be saved annually if this practice were adopted. Boiled linseed oil is the best for general use, although it is now known that crude petroleum on even old wheels is of great benefit.

How to Cut Glass.—Employ a large knitting needle of stiff platinum wire, which is kept hot by holding it in a gas flame. A file mark is made to commence the cut, and the vessel to be cut off is supported or held as near as possible to the flame. One end of the needle is heated to a bright red in the flame, then passed through the flame until it touches the glass about half an inch or less from the file mark. By keeping the needle in the flame it remains very hot and the crack will follow the needle after a few seconds. If the end of the needle gets too cool, it may be brought into the flame again, but the conductivity of iron for heat is such as to keep the end that is only half an inch from the flame very hot. Holes may be bored into a beaker or flask by first warming the spot, and then pressing the hot needle end against it and boring into it. To insure a crack instead of perforation, the vessel to be cut must be kept quite cold during the operation.

Plating and Gilding Without a Battery.—A very useful solution of silver or gold for plating or gilding without the aid of a battery, may be made as follows: Take, say, one ounce of nitrate of sil ver, dissolved in one quart of distilled or rain water. When thoroughly dissolved, throw in a few crystals of hyposulphite of soda, which will at first form a brown precipitate, but which eventually becomes redissolved, if sufficient hyposulphite has been employed. A slight exceess of this salt must, however, be added. The solution thus formed may be used for coating small articles of steel, brass, or German silver, or by simply dipping a sponge in the solution and rubbing it over the surface of the article to be coated. We have succeeded in coating steel very satisfactorily by this means, and have found the silver so firmly attached to the steel (when the solution has been carefully made) that it has been removed with considerable difficulty. A solution of gold may be made in the same way, and applied as described. A concentrated solution of either gold or silver thus made, may be used for coating parts of articles which have stripped or blistered, by applying it with a camel-hair pencil to the part, and touching the spot at the same time with a thin clean strip of zinc.

The Metallurgy of Nickel.

Dr. Kollmann gives some interesting particulars as to the metallurgy of nickel, the industrial applications of which metal have become very numerous since the process of Dr. Fleitmann has permitted of hammering and welding it. Previously alloys only of nickel, with copper and other metals, were worked; because pure nickel could be neither rolled nor hammered on account of the gases absorbed by the metal during fusion. The Fleitmann process for obtaining malleable nickel consists in adding 1·2 per cent. of magnesium, which eliminates the gases. Pure nickel has the advantages over its alloys of preserving its brilliancy in a damp atmosphere and of not being attacked by organic acids. Nickel may be perfectly well united to iron, which permits of substituting the process of plating for the thin coating deposited by the galvanic battery. The properties of nickel are, in fact, nearly the same as those of iron. Its elongation in forging and rolling is equal to that of Bessemer metal of medium hardness. A steel ingot may be welded to two ingots of nickel, one each side; and, on passing the three together through a pair of rolls, sheet of any practical thickness may be obtained perfectly coated with nickel. In the same way a nickel coated steel wire may be obtained by wire drawing. Nickel welds and melts at the same temperature as steel. In the process of nickling by electro-metallurgy, the double sulphate or chlorate of nickel and ammonia are generally used. These salts, however, undergo certain changes according to the forces of the electric current or the length of time during which the solution is subjected to its action—changes which are principally on the ammonical solutions, because the ammonia is evolved at the poles in a state of gas. On the other hand, it has hitherto been impossible to use the simple acid salts of nickel, because they often give rise, under the influence of the electric current, to a grey or black deposit, which is not adhesive, instead of the true metallic deposit. This would appear to result from the formation of a sub oxide, a sub-chlorate, or other sub-salts, which accompanies the metal. Mr. Powell, of Cincinnati, has found that the addition to the saline solutions of nickel of benzoic acid, corrects this tendency towards an imperfect deposit. It is, besides, no longer necessary to use chemically pure products, as all the impurities contained in the salts of commerce are completely neutralized by the benzoic acid.

The Tides from a Scientific Point of View.

From a scientific point of view, the work done by the tides is of unspeakable importance. Whence is this energy derived with which the tides do their work? If the tides are caused by the moon, the energy they possess must also be derived from the moon. This looks plain enough, but unfortunately it is not true. Would it be true to assert that the finer of the rifleman which pulls the trigger supplies the energy with which the rifle-bullet is animated? Of course it would not. The energy is derived from the explosion of the gunpowder, and the pulling of the trigger is merely the means by which that energy is liberated. Similarly, the tidal wave produced by the moon is the means whereby a part of the energy stored in the earth is compelled to expend itself in work. For the purpose of illustration let us suppose the earth rotating on the axis and the fly-wheel of an engine. The fly wheel is a sort of reservoir into which the engine pours its power at each stroke of the piston. The various machines in the mill merely draw off the power from the store accumulated in the fly-wheel. The earth is like a gigantic fly wheel detached from the engine, though still connected with the machines in the mill. In that mighty fly-wheel a stupendous quantity of energy would be given out before that fly-wheel would come to rest. The earth's rotation is the reservoir from whence the tides draw the energy they require for doing work. Hence it is that though the tides are caused by the moon, yet whenever they require energy they draw on the supply ready to hand in the rotation of the earth. The earth differs from the fly-wheel of the engine in a very important point. As the energy is withdrawn from the fly-wheel by the machines in the mill, so it is restored thereto by the power of the steam engine, and the fly runs uniformly. But the earth is merely the fly-wheel without the engine. When the work done by the tides withdraws energy from the earth that energy is never restored. It therefore follows that the earth's rotation must be decreasing. This leads to a consequence of the most wonderful importance. It tells us that the speed with which the earth rotates on its axis is diminishing. We can state the result in a manner which has the merits of simplicity and brevity. The tides are increasing the length of the day. At present, no doubt, the effect of the tides in changing the length of the day is very small. A day now is not appreciably longer than a day a hundred years ago. Even in a thousand years the change in the length of the day is very small. A day now is not appreciably longer than a day a hundred years ago. Even in a thousand years the change in the length of the day is only a fraction of a second. But the importance arises from the fact that the change, slow though it is, lies always in one direction. The day is always increasing.—*London Nature.*

Driving Belts.—Prof. J. Bauschinger publishes the results of a series of tests of the tensile strength of different sorts of belting made in the mechano-technical laboratory at Munich. In making a graphic representation of the results by setting the loads per square inch on a horizontal line and erecting verticals corresponding to the elongations at the different loads, the curves thus obtained show considerable difference for leather, india-rubber, and cotton belts. All these materials stretch more at first, with light loads, than afterwards. The lines, therefore, are more curved at the beginning, and afterwards approach more to a straight line. But with leather belts the approximation to a straight line begins at once, and is more pronounced than with india rubber or cotton belts showing that they stretch from the beginning more in proportion to the load, and possess a high degree of elasticity. The conclusion drawn from the tests by Prof. Bauschinger is that india rubber and cotton belts are inferior to leather, not only as regards elasticity, but also as regards tensile strength, for the same section, and only attain in strength that of medium or inferior sorts of leather. By cementing and sewing the ends, together straps lose one quarter to one-third of their strength, if the joints are made with great care. According to the experimentalist, therefore, the old saying, "There is nothing like leather," also applies to driving belts. Experiments make by M. Leloutre on the transmission of power by belting disclose a curious fact, namely, that while the elongations or successive increments of length become less and less up to a certain load, they then become greater and greater, showing a point of maximum power of resistance which is then followed by a falling off; after this decline of resistance the elongation again becomes rapid up to the breaking strain, on approaching which the resistance is generally greater. Practically, in the case of ordinary leather, the maximum resistance to stretching is met with at a strain of about eight hundred and fifty pounds per square inch, while in India rubber and webbing it occurs at rather a lower strain—the fact appearing, therefore that the working strain on a belt should be fixed as near as possible to that at which the maximum resistance to stretching is known to occur.

The Ostrich.—United States Consul Baker, of Buenos Ayres, thinks that the ostrich can be domesticated in the United States and made profitable. He describes an ostrich farm situated about fifteen miles from Buenos Ayres and gives many instructions for the benefit of those in this country who may desire to go into the business. Full grown birds cost from $1,000 to $2,000, delivered at Buenos Ayres, and 5,000 birds can be kept on 6,000 acres of land. The gross income derived from chicks produced by one pair of birds is from $2000, to $3,000 per annum. At Cape Town Colony $40,000,000 are invested in this business, and the value of the feathers annually produced is $4,500,000.

The Nation's Characteristics.

Shrewdness and incredulity are the predominant characteristics of the American people. They will take no stock in an article unless it is meritorious. When Dr. Swayne launched his Ointment for the Piles, that itch so intensely at night, on a sea of human suffering, the physicians laughed, but the people tried it all the same and manifested their approbation in a National endorsement. Now the allopaths and homeopaths are laughing the other way. This world is full of reverses.

PRACTICAL MECHANICS.

Cutting Tools and their Uses.

A letter sent to this department a few days ago asked the question "What are Edge Tools?" It may be difficult to make the definition desired, and so the writer has chosen to make some remarks on the different styles of cutting metals and woods with a brief reference to the tools employed.

"Cutting," as general understood, is illustrated in the cutting of bread by a bread knife, the slicing of meat by a carving knife, the whittling of wood by a pocket knife, and other handy methods of using the knife, razors and similar implements. All these methods depend upon their utility by drawing the cutting edge over the substance, and not merely separating fibres by breaking them or cutting them square across. This method of cutting is not applicable to metals, to ivory, and to other substances whose rigidity is greater than their tenacity, nor to those whose compactness is greater than their porosity. As instances, cast steel and cast iron are rigid and compact, while wood and baked wheat in the loaf are porous and tenacious. The one cannot be properly cut by a drawing out, while the other cannot be readily cut by any other method.

A wedging cut is a violent disruption of the particles by blows or pressure, and consists in lifting the particles to be moved from those which are to remain. In the case of the cold chisel the particles are driven in front of the edge of the chisel by blows; in the case of the planer cutter they are pressed forward by the movement of the planer platen against a fixed cutter; and in the case of the lathe the cutter lifts the material on a rotary motion which allows the cutter to operate on an almost infinitesimal period of time. So it will be noticed that while a turning tool in a lathe may be so used as to leave hardly any marks of its progress, it leaves its results not only visible, but in actual ridges. The separating of parts of a substance by shearing—one cutter operating against another—is not "cutting" in the proper sense of the term—it simply means that there is not space for the material to pass between two closely opposing obstacles. In the sense of edge tools, the wheels of a locomotive or of a railroad car are as much so when combined with the rail, as the two blades of a pair of scissors; so scissors can hardly be called "edge tools." In fact, there is no such thing as a positively cutting mechanical tool. The sharpest edged drawing tool, as a razor, is merely a means of separating portions of material that have already invited to a rupture by the spaces between their particles. The razor simply finds its way between them because it has a thin wedge-like edge, and when the separation is completed the microscope shows the ends of the separated hairs as the sheared ends of grass stalks the scythe has cut; and this cut is a shearing cut, not a positive, square, diametrical separation. Even with the heaviest, most rigid, and most exact shearing machines in use there is no instance of a perfectly square cut across the fibre of the metal. This is so well understood that all shearing machines in use in our shops and large manufactories merely cut bars to crude lengths; and if exactness is required, the bars are placed in a cutting-off lathe that gradually turns a score from circumference to centre, cutting its way by means of a fixed chisel against the rotation of the shaft, or bar. All this slant or "shear," as mechanically called, is occasioned by the resistance by the material to the intruding cutter, and in no case does it allow the cutter to pass without presenting the obstacles of its matter. With the best, most closely geared, and rigid planer it is impossible to produce an equable, smooth face, even with the finest feed. In fact, it is impossible to produce a surface that does not show "the planer marks" to the naked eye. The best finished planed surfaces of the finest gray cast iron or low steel must be scraped to surface to have a surface. Between every ridge of the finishing cut of the square-nose tool of the planer shows a dark gray furrow, in plain distinction to the polished ridge. Under the microscope the polished ridge is a burnished ridge, the disturbed and serrated particles being erect or bent, but crowded by the passage of the non-cutting portion of the tool; while every longitudinal depression shows the particles of the disturbed metal standing up like the horrified bristles of the annoyed porcupine. To produce an even surface, hand manipulation is brought into action by scraping, which more gently removes the superabundant surface and allows us to claim, in our coarse mechanical way, a "true surface." But even this is only an approach to absolute perfection; yet scraping is nearer actual cutting of the metal than the best preliminary of the planer. Probably the lathe gives the best first results of cutting metals. With a fine feed and broad-nosed tool we can get a very good surface requiring but little abrasion to bring ridges down and depressions up to a general surface. And even in this case all the after finish is but a repetition of the former action. Whether the material used is a tool or an abrasive substance the action is merely a cutting away of the superabundant material.

Burnishing on metals simply means returning to its place the disturbed particles, but even that does not close up perfectly the gaps left by the removal of portions of the material. In short, there is no absolute cutting of materials. The best we can do by our best mechanical means is to remove unnecessary material and make the disturbed surface conform, in some approximate degree, to a fixed gauge, or to some other surface it is intended it should fit.

Cutting implements, whether edge tools or other appliances, are merely means of separating rejected from useful portions of material, and do not reach the particles of the material itself. We can give no perfect surface to material simply by removing a portion. We may reduce in size, and make fits, but the best surface given by mechanical means is a depression of torn or ruptured surface by burnishing, or the mechanical-chemical action of friction and heat as shown in the interior of a steam cylinder or on the face of a steam valve.—[Cold Chisel, in Boston Journal of Commerce.

Making of Axes.

There are different methods of making axes, and it needs no expert to discriminate between them. It is of especial importance to the man who must earn his living by aid of the axe that he be able to distinguish between mere show and lasting surface; and to furnish the help to an easy decision, the steps usually pursued in the manufacture of these tools are here explained and illustrated.

An axe is made in two parts, a "pol" or head of iron, and a "bitt" or cutting blade of steel; the place where these are joined or "welded" may be recognized by a faint line a few inches above the edge of the axe.

Axe polls or heads are made either by punching the eyes out of solid iron or by welding together the ends of blanks of iron that have been bent around to form the eye. Polls with the eyes punched out are the strongest and best. Axe bitts or cutting blades are made either by splitting or opening the iron, inserting the steel blank, and then welding the iron and steel solid as one piece, or by welding a thin envelope of steel to the iron, whereby is secured a handsome exterior with a large display of steel surface with but little wear or durability.

Axes having the steel welded over the iron, appear to have a large amount of steel in them, while in reality the steal available for a cutting edge is only about five ounces of the nine and one-half ounces used, while in axes with inserted steel, a cutting edge is available until all the steel is worn. The latter is not less than twelve ounces in a 3½ lb. axe, thus yielding more than twice the wear of steel applied. Axes made with solid punched polls and in serted steels of full weight, vary from 12 to 18 ounces in each axe, according to its size.

After forging the hardening and tapering are done in rotary ovens which hold a large number of axes or other implements of a metal are thoroughly worked under a 2,000 pounds steam hammer to blooms and billets and finally rolled to form.

In all these processes, as in all the after manufacture, there should be a regular system of inspection, carried so far that specimen articles in their finished state might be periodically destroyed by tests to prove the uniformity of the class of which they are individuals. Inspection means regard for reputation, reverence for established standards, and no expense is spared to test rigidly and impartially both material and product at every step and stage.

The ordinary mode of making picks with raised or "adze eyes," is by taking bars of iron of the full width required for the body and eye of the pick, and from this bar forming the raised eye. Eyes so made are very weak, and the raised part of the eye will split, because the fibres of the iron offer no resistance except their ordinary cohesion, as they are broken by the cutting down of the bar.

The best eyes for picks are made from bars of iron, square, or nearly square, which are placed in powerful machines, and at one operation the eye is formed, and at the same time the fibre of the bar is forced into what might be called double arches. This process of manufacturing produces eyes that are strongest at the points where the greatest strain is sustained.

Electricity and Metallurgy.—The Cote Libre relates the following interesting experiment made by Mr. Siemens in the presence of the members of the late Electric Congress: A number of broken pieces of steel were put in a suitably arranged crucible, with a perforated lid to it. The two currents of the electro-motor terminated in the upper and lower part of the crucible. In fourteen minutes the entire mass of metal was heated, turned red, and liquefied. There was not a single bubble in the mass. The cost of fuel required for this apparatus is very much less than that which would be wanted if this fusion were effected by the direct application of the heat. A considerable saving may consequently be effected in steel works if the proceeding can be generally applied. It appears that the fitting up of the apparatus involves little or no difficulty.

Imperfect Castings.

When a casting has been imperfectly mended, and has been done again, it will be liable to crack two or three inches from the fracture, the reason of this being that the metal two inches back from the fracture has lost all its elasticity, in short it is calcined—it has become like the top or rather middle part of a furnace bar that has long been in use. The two inches of the casting next the fracture are dead; and even should the second mend be a complete weld, if that part is struck lightly with a hammer it will be very liable to break two or three inches from the original fracture; hence, if a mend is not properly done on the first trial, you cannot go back to it again with success. The best thing to be done on a second burn being resolved on is to cut three inches off next the fracture, and in this way you come to good metal again.

It may be fairly questioned—Is a burn as good as if the casting had never been burnt? We at once answer (assuming the mend has been properly done, and there are no symptoms of a crack on any part of the casting), it is equally as good as if no burn had taken place. For example, we have known the tooth of a spur-wheel burned on to stand, which have come back to us again broken on the same blade, but never near the burn. Therefore, from carefully watching the results of mending castings, our impression is that the mend when properly done is equal in strength to the rest of the casting.

It may again be asked—Would the burning have an evil tendency on any other part of the casting, even a considerable distance from the mend, and thus when the working strain is put upon the casting cause that part to give way? In answer, we would say that it may and even does take place in castings of a certain structure, such as bed-plates, condensers, cylinders, girders, etc., where it is difficult to determine on what part of the casting an undue strain may take place, owing to a portion of it being made to a melting heat, cast iron being of such a nature that it may be on the point of flying and no one be aware of it; but in plain castings, (and especially when the mend is at the extremities), we scarcely think that burning has any vital effect upon the other parts.

When a mold has been cast, and an irruption takes place, however slight, if the moulder is sure that metal has been vomited out, it is well to take the top part of the mould off to see the casting. The hollow blown places can then be quickly and safely burned, the casting being in a bright red state. Sometimes a mould will blow and vomit metal out for a considerable time, and then after it has relieved itself of the gases it will take back quietly all the required metal, in which case the casting is seldom blown. In other cases a mould will blow violently for some time, and as far as can be seen not take any metal back, and on the top part being taken off will show no symptoms of requiring to be burned; but when this does occur the soft parts of the casting are found out when it is too late to burn it, and most likely on parts where it would be foolish and impracticable to try it.

Blisters or shells on a casting are easily mended when they appear after being recently cast. They are generally to be found on green-sand castings, and are caused through hard ramming on the top part, and the want of the free use of the ventwire. They are seldom above a quarter of an inch deep, two or three inches in length, and an inch broad, and very often castings are condemned on account of their presence.—[Wood & Iron.]

Casting Ingots of Different Steels.

To produce an ingot of different grades of metal, for use in the manufacture of articles of steel or homogeneous iron, or iron and steel, which shall possess the toughness of one grade of metal, and the hardness of the other grade, Mr. E. Wheeler, of Philadelphia, uses by preference two Bessemer converters—one for one grade and the other for another grade of metal, and prepares a mould in which a core is placed at the side or centre. The metal is poured from one converter into the mould, and when that portion of the metal in contact with the core has become sufficiently hard the core is removed, the hard skin preventing the fluid metal from flowing into the space left by the core, into which space is at once poured molten metal of a different grade from another converter. This last mass of metal fuses the hard skin left by the withdrawal of the core from the mass of metal, and the two metals become united and form a homogeneous ingot, in which, however, they occupy distinct positions. In some cases the ingot is formed by heating a bar of one grade of steel or homogeneous iron nearly to the point of fusion, placing it in the mould in place of the core

described above, and pouring another grade of metal into the space around the bar, the heat of this metal being sufficient to fuse the outer portion of the core, and thus effect a union of the two metals. If it is desired to prepare an ingot with a soft centre and a hard exterior, the metal which is poured around the core, may be cheap high-phosphor steel or iron, while the metal which takes the place of the core, is soft iron or steel low in carbon or homogeneous iron. If, on the other hand, it is desired to prepare an ingot with a hard centre and a soft, tough exterior, the soft metal is poured around the core, and the high-phosphor metal is poured into the interior. This latter arrangement of the metals in the ingot is especially desirable when it is to be employed in the making of armour-plating. When the ingot is to be worked up into railroad rails it is preferable to make it with a hard centre and a soft exterior, with a preponderance of the soft metal on one side, so that when the ingot has been rolled into rails the head will be of hard metal, while the flange and sides will be soft. In ordinary rails, on the contrary, the head is almost invariably hard, while the flange and sides will be soft. In ordinary rails, on the contrary, the head is almost invariably soft, while the flange is hard, owing to the rapid cooling of the thin parts, while the head cools more slowly, and is consequently softer. The ingots thus cast being of malleable metals, may be worked up into almost any and all articles of manufacture.

Lubricants.

By E. F. Dietrichs.

[Concluded.]

Many lubricants, under a variety of names, often entirely inappropriate, deceive the inexperienced as to their origin and quality. Mineral oils of low gravity, from flowing wells, enjoyed for a long time great reputation as lubricants, and the Mecca oil and West Virginia of 28 degrees in their natural state became widely known and commanded advanced prices, but soon the demand outrun the supply of the genuine article and pumping was resorted to, and all kinds of mixtures, even those from still-bottoms of refineries, are now sold and eagerly bought under those once famous brands. Oil mixtures, consisting of watery emulsions with the aid of alcaline or mucilaginous additions, hardly deserve mention. Their value also depends alone on the proportion of real fatty matter they may contain, but the temptation of apparent cheapness does mislead until slow but unavoidable injury convinces to the contrary.

Proprietors as well as employes in many establishments rely on the apparently indirect absence of proof that the use of poor lubricants is poor economy, and consider the subject of lubricating hardly worth studying. They forget that the needed motion cannot be produced without friction, and that frictional heat, if not controlled, not only injures the machinery, but retards the motion, and thus increases the original expense necessary to produce it. The mere pouring on of oils is of no economical or practical use, and the excuse for purchasing poor lubricants, that the employes waste and carelessly handle it anyway, is no more admissable than the direct misuse of machinery by careless employes would be tolerated. Poor lubricants and careless and injudicious lubricating are the indirect cause of many stoppages, breakdowns and repairs; the injury is worked imperceptibly and slowly, but surely.

Just here we may also call attention to not uncommon errors arising from want of better knowledge of the nature of lubricants, and while much depends on their quality, many mishaps, from entirely different causes, are charged to their inefficiency; for instance, in changing from one kind of lubricant to the use of another, especially if the latter is better and freer from gummy matter, it stands to reason that the accumulated deposits left by the former must eagerly be taken up by the latter, and thus the deposits from large quantities of the former become suddenly incorporated with a small quantity of the latter, and it is easy to understand that this must work injury if not speedily relieved by liberal additions of the lubricant until all such deposits are removed and the new lubricant been enabled to form its own cushion, yet the better lubricant is generally blamed.

It is erroneous to expect one kind of oil, however good, to serve thoroughly and economically for all the manifold requirements in a factory, and it needs not much observation to understand the fallacy of such course. Lubricating a cylinder and valves means lubricating in the presence of heat and moisture, and the lubricant to be effective should have greater consistency than a lubricant applied to machinery at ordiuary temperature, and lighter machinery in rapid motion requires a more liquid, penetrating, but nevertheless tenacious lubricant, than is needed for machinery of heavier weight and slow motion.

Again, an oil used for lubricating running machinery effectually cannot be expected to do efficient duty for screw or thread cutting, for drilling, etc., as the requirements in each case are widely different. The heating of bolts, pipes or screws and their dies, emanating from the frictional motion, is not so continuous as in the case of running machinery, where the lubricants have to absorb and rapidly eradicate the heat evolved. In screw cutting, etc., the metallic surfaces are of very different density, their contact with each other is limited and constantly changed for new cool metal, so that ample time is afforded for the complete eradiation of the frictional heat, and hence the heavy, glutinous animal oils, with their superior heat absorbing but slow heat eradiating power, are more efficient thau the mineral oils, which eradiate heat faster than any amount of glutinous or resinous matter incorporate with them seems able to absorb.

The watery preparations and emulsions intended to extend and liquify the lubricant for cutting small screws with rapid motion stand in the same relation to the heavy oil used for cutting pipes and bolts as the more liquid lubricator, needed for lighter and fast running machinery, stands to the heavy oils, used to lubricate cylinders and heavy bearings, and neither is able to do the duties of the other effectually and profitably.

The many contrivances by which lubricants are applied to the machinery should also find mention here. There is the old style cup, the old fashioned pump, and there are the modern automatic devices. The adaptation of these contrivances is with many just as much a consideration of price as it is in the purchasing of lubricants, but here, as well as there, the best are the cheapest. With the old style pump and cup much of the lubricant is wasted as the feeding is so instantaneous, and under the handling of the careful even a much larger amount of oil is pumped and applied to the parts than can at once be effectually distributed, and much is blown out and wasted uselessly. This is entirely overcome by the modern, and some of them are very ingenious, automatic contrivances, which, if properly adjusted, will do the oiling as regularly and economically as any machinery made to abide men's will. Some of them, however, are at first sight very recommending, but as some depend on the evolving of a certain degree of heat to make them active, and others allow severe heating of the lubricant previous to its application, they should all receive careful examination before being adopted, and the purchaser should be guided by the consideration that it is the lubricant and not the pump or cup that has to do the work, and is applied to avoid accumulation of frictional heat, and the sooner, the cooler, and the more direct the lubricant reaches the parts to be lubricated, the more effective and economical this will be done.

A Strong Iron Boiler.—According to the Moniteur Industriel, Eessrs. Imbert Freres, of St. Chamond, are making an iron boiler, to be tested to 100 kilos per centimenter, or 1,420 pounds per square inch, which is ten times the testing pressure of ordinary boilers, and more than double that of any boilers made hitherto. The plates are 1⅛ inch to 1½ inch thick, and this makes it impossible to rivet them. Messrs. Imbert Bros. have welded them by special machinery. It is not stated what purpose this boiler is intended for.

Cleanliness of Boilers.—Concerning cleanliness of boilers the American Machinist says: If dirty water is used in boilers of any kind they should be frequently washed out. We remember an instance some months ago where a set of tubes were greatly damaged and several of the bottom rows burned out by reason of the dirt within the boiler. They were repaired, and the same thing occurred again. Finally the suggestion was made to wash the boilees once a week if they were dirty, which suggestion was carried out, since which time there has been no trouble from that source. It has also been noticed that the valve seats and cylinders are not scratched as much as previously, and the boilers steam very freely, which, of course, reduces the coal consumption. Boilers should be always washed when they are dirty.

The Prospects of Mill Building and Refitting.—Reports received from millwrights and mill furnishers in all departments of the trade confirm our previously expressed opinion that the present season is to be a busy one. While a large number of new mills are to be built, it does not seem that the "boom" proceeds from this fact, but rather from the large amount of overhauling and refitting that is to be done. Many mills are intending to add machinery; in most cases not to increase their capacity, but their efficiency. Some will add new bolts, other pursifiers or cleaning machines, and others still, machines for the better handling or finishing of bran and middlings. We know of no year which has promised so well for trade in special machines. This is especially true of the older milling states where millers are taking hold of the question of improvement in a manner that does them credit. Last year's efforts in this matter did much to redeem the reputation of winter wheat flour, and this year promises a still more extensive movement in the same direction.—American Miller.

RAILROADS AND TRAFFIC.

The Cleveland, Indiana and St. Louis Railroad has absorbed the Paris, Montezuma & Northeastern Railroad.

The electric light is to be introduced on the Pan-Handle, and the entire track from Pittsburgh to Cincinnati lighted.

There is said to be a movement on foot for the consolidation of the New York Central and Lake Shore.

The survey of the narrow guage Painesville & Youngstown Railway, commenced March 22, will be continued to Pittsburgh, to which place the road will be extended during the coming summer.

Work has been commeuced at Bowling Green, O., on the Toledo & Indianapolis air line, which it is rumored is to be a branch of the New York, Chicago & St. Louis. It will strike the Ohio Central at Stony Ridge, nine miles south Toledo, running into Toledo over the tracks of the company.

The statement of the directors of the Cleveland, Columbus, Cincinnati & Indianapolis road for 1881, shows gro earnings to have been $4,376,722, and net earnings $1,469 452.

It is asserted that the Wheeling & Lake Erie Railroad, now under construction between Pittsbugh and Akron, O., will there join the Pittsburgh, Youngstown & Chicago. This will make a direct line from Toledo via Youngstown to Pittsburgh, where connection will be made with the Connellsville branch of the Baltimore & Ohio for Baltimore and Washington.

It is reported that holders of 112,000 shares of the Great Western Western Railway of Canada have agreed to lend their aid to the consolidation of that company with the Grand Trunk.

The directors of the Philadelphia & Reading Railroad Company have decided to pay off the entire general mortgage loan the 18th of July. The amount of bonds outstanding is $19,000,000.

The Montreal Railway Journal, after enumerating the many new Canadian railway schemes, opines that Canada is going too fast.

The "Southwestern Railway system," also known as the Gould system, now comprises 4,057 miles.

The Manufacture of Agricultural Implements.

The rapidity with which certain lines of manufactures are moving West is one of the significant indications of the times. This tendency is conspicuously illustrated in the manufacture of agricultural implements. The following are some of the figures given by the Census Bureau, which show the number of hands employed and the value of fabrics produced in the years 1850 and 1880.

	Hands employed. 1850	1880
Illinois,	616	9,820
Indiana,	210	2,984
Iowa,	15	1,055
Kentucky,	217	1,387
Michigan,	35	2,403
Minnesota,		1,387
Missouri,	39	959
Ohio,	765	9,030
Wisconsin,	178	2,542
	Products.	
Illinois,	$761,970	$14,259,175
Indiana,	146,025	4,460,408
Iowa,	17,900	1,271,872
Kentucky,	184,614	1,647,116
Michigan,	30,600	3,102,638
Minnesota,		2,340,288
Missouri,	37,550	1,141,822
Ohio,	557,932	15,473,825
Wisconsin,	187,335	3,742,069

Bradstreets says: "Since 1850 the value of products has increased more than $60,000,000, or over tenfold, and a glance at the table will show that the bulk of the increase has been in the western States. For example, Illinois, Indiana, Iowa, Ohio, Michigan, Minnesota, and Wisconsin, produced in 1880, in round numbers, $45 000,000 out of the $70,000,000, or 64 per cent. In 1850 the table shows that these six States produced in the aggregate but $1,701,762 worth of agricultural implements, whereas in 1880 their product was $44,640,275 an increase of twenty-three fold. In 1850 New York, Pennsylvania and Massachusetts were the great agricultural implement manufacturing States, but to day they have changed places with the prairie states of Ohio, Illinois and Indiana. Many of the eastern States have actually decreased

in this industry, while the west has gone steadily along, first overtaking and now surpassing its eastern competitors in the number of hands employed and the value of the products produced."

FACTS

For Machinists, Manufacturers and Others.

Money as a Medium of Exchange.—In the early days of California when Government coin was almost unknown, private persons struck off gold coins to be used as exchange. As they had not the Government device they were not counterfeits; but neither on the other hand were they legal tender. Nevertheless as they were equal in value to the legal coins, they passed as such, and in every sense of the word they were money. Before this gold dust had been used as a medium of exchange, and though inconvenient, it also was money. Then at last the Government established a mint, and money which was a legal tender came into use. Now these three things, dust, private coins and legal tender, were all money. If California had used skins or tobacco instead of gold, as our ancestors of Maryland and Virginia did, these things would also have been money. All things in common use—skins, tobacco, musket balls, cattle and the various metals—have at different times in the world's history been used as money. We see from this that money must have a value of its own, that it must be serviceable and the creation of labor. Some things are better than others as representatives of value, and mankind, having tried almost everything, has finally by general consent, decided in favor of gold and silver for these reasons: They combine much value with little weight, so that they can be easily handled; they can be divided and subdivided, without losing their value; they are not subject to loss by exposure to the atmosphere; they will take a fine impression, and are not easily counterfeited; they are always the same in character, never inferior; they are reasonably stable in value. The amount of gold in the world to day is about five thousand millions of dollars; there is about twice as much silver. About one hundred and fifty million dollars are added to this every year. With such an amount as this there is a sameness in the value which makes these metals the best medium yet discovered. Of course there are variations even in the value of these metals. Gold is the only standard of value in the estimation of people in general; checks, drafts and bills of exchange are merely convenient substitutes for money, but not, strictly speaking, money itself.

The Future of Shipbuilding.—Consul Jones of Newcastle, England, reports: It is interesting to watch the tendency which indicates the future of shipbuilding. Wooden vessels are being entirely superseded; sailing ships of iron also are losing favor, while steel ships continue to be built, especially on the Tyne, though not in large or increasing numbers. The Clyde turns out a greater number of sailing vessels than any shipbuilding river in the United Kingdom. Fifty-two vessels of this character were launched last year, against 217 steamers. My figures do not show whether any steel ships were built on the Clyde during 1881 or not. The Wear turned out four iron sailing vessels, representing 5,021 tons burden; the Tees four sailing-vessels, of an aggregate tonnage of 7,053 tons; while the Tyne and Hartlepool report no sailing-vessels built during 1881. But the Tyne continues to lead other rivers in the construction of steel vessels; four steamers built of this costly metal were launched here during the year just closed. It is significant, however, that these figures show a considerable falling off since 1880. The relative prices of steel and iron plates in January, 1881, were: steel plates, £10 per ton; iron plates, £7 per ton. But now, or January 1882, the prices are: steel plates, £11.5 per ton; iron plates, £7.5 per ton. It will be observed that steel plates have advanced in price out of proportion with the price of iron, a fact which accounts for the falling off in steel ship building; for this competition between steel and iron resolves itself into a question of cost. The superior buoyancy and consequent greater carrying power of steel vessels can only claim precedence and obtain preference over iron ships when steel plates can be bought at considerable reduction in the price of steel considered relatively to iron.

Self-Lighting Electric Buoys.—A novel application of the motive power supplied by the waves of the sea has been designed by an American inventor, Mr. Bigler, of Newbury, in the utilization of the movements of the water for the purpose of illuminating an electric lamp attached to buoys placed to mark sunken rocks or other dangers to navigation. Experiments recently made at New York seem to prove the practicability of the scheme. A small dynamo-electric machine is fixed to the buoy, connected with a mechanical contrivance so arranged that the movements of the buoy as it is tossed about by the waves, set in motion and so generate a current of electricity, which is conveyed to an Edison incandescent lamp fixed outside the buoy. The intermittent action of the waves conveys a corresponding intermitting action to the machine, and causes a similar alternate illumination and extinction of the little lamp. Consequently, when the sea is rough, the lamp is instantly lighted, and remains alight during the passage of one wave over the side of the buoy, and then remains extinguished till the next wave sets the machinery in action. This ingenious contrivance is an adaptation of an existing method of causing buoys to become self-acting fog-horns. The buoy is fitted with an apparatus so placed that the pressure of a wave confines a certain amount of air in a receiver from which it can only escape through a whistle or horn. By this means a warning sound is emitted at short intervals, more or less intense, and of longer or shorter duration, according as the sea is rough or smooth. During a calm, when the buoy is easily seen or avoided, both foghorn and warning light are not in action; but they both come into activity when the violence of the sea increases the necessity for the signals which they afford.

Concerning Spars.—The New York correspondent of the *Lumberman*, in going his rounds in Brooklyn, says: "I found Mr. Cornelius Winant, spar maker, at home, sitting on a pine log from Michigan, 87 feet long, which contained about 2,500 feet. Regarding the business Mr. Winant said: 'It languishes. When ship building is quiet our work is quiet. I have a large amount of good material, say 2,000,000 or 3,000,000 feet, some here, some in Troy, and some in Tonawanda.' Talking about the cost of a mast, made from the log upon which we sat, he said it would be $200. 'Shipowners,' he continued, 'often growl at prices, but if they would go up to Michigan forest and follow a stick once in its travels, and count up the cost of preparing it, all by hand labor, they would not find much fault.' These logs are usually brought by water, but Mr. Winant brought some through from Buffalo on cars, and convinced the canal people that they could freight as cheaply that way. An investigation was had, and probably long timber will be carried at lower rates this season. It seems that the idea got among the Erie canal people that they could freight as cheaply that way. An investigation was had, and probably long timber will be carried at lower rates this season. It seems that the idea got among the Erie canal people that the movers of long timber wanted it carried by measurement at the long end of the log, and so tucked on the tariff. Mr. Winant convinced them of their error. Long timber for spars and masts is measured in the middle. Saw logs of 12 feet or so are measured at the small end."

Protection of Buildings from Fire.—Brick is the only real fire-proof material available at reasonable commercial cost, and it should be used in masses of considerable thickness to be safe. Light square pillars will not stand. Piers of some thickness and of considerable horizontal length will long resist fire. The safest story post—*i. e.*, a post supporting a floor at reasonable cost—is one of some hard and not resinous timber. Posts of oak, of fourteen inches square will stand safely through almost any fire, until the powerful force and means of our city fire departments are able to quench the fire. If wrapped with wire netting, covered afterward with plaster, they will suffer still less; but the naked wooden post will remain cool and strong in its center for hours, and the fire will not for a long time char it to a depth sufficient to much injure its strength.

A steam plow from England has arrived in Minneapolis. It weighs 6,000 pounds, and is operated by two engines and a cable. It will be tested somewhere in that vicinity.

Logs and Lumber.—The firm of H. K. Porter & Co., Pittsburgh, Pa., has issued a little book which contains a deal of interesting and useful matter. We make a few extracts, which refer to the weights of logs, lumber and cord wood. The weight of green logs to scale 1,000 feet, board measure, is stated as follows: Yellow pine (Southern), 8,000 to 10,000 pounds; Norway pine (Michigan), 7,000 to 8,000 pounds; white pine (Michigan), off of stump, 6,000 to 7,000 pounds; the same out of water, 7,000 to 8,000 pounds; white pine (Pennsylvania, bark off, 6,000 to 7,000 pounds. The weight of 1,000 feet of lumber, board measure, is thus given: Yellow or Norway pine, dry, 3,000 pounds; green, 5,000 pounds; white pine, dry, 2,500 pounds; green, 4,000 pounds. The weight of one cord of seasoned wood, 128 cubic feet per cord, is stated to be: Hickory or sugar maple, 4,500 pounds; white oak, 3,850 pounds; beech, red oak or black oak, 3,250 pounds; poplar, chestnut or elm, 2,350 pounds; pine (white or Norway), 2,000 pounds; hemlock bark, dry, 2,200 pounds.

New Furnace for Boilers.—A recent English invention, relating to furnaces for steam generators, consists of a double bridge wall, the space between the two walls being spanned by grated plates, covered with loose fire-brick or other material. Underneath this is a second grating, the openings through which are controlled by a correspondingly grated valve. The operation of this is said to be that the covering of the upper grating becomes intensely heated by the fire, when it is clear, and each time the furnace is charged with fresh coal, air is admitted through the grated valve, and passing up through the covering, absorbs the heat. The valve is connected to the door so as to be opened with it and is closed gradually, thus furnishing hot are when needed, to prevent smoke.

Novel Electric Light.—In a large banking house in Paris, the use of the electric light is novel and striking. One of the peculiarities of this system is that the offices are illuminated by the Jasper reflecting system, but it is the ceiling itself which is used as a reflector. The effect is said to be splendid. A large hall is illuminated from the top by sixteen Serrin & Siemen's regulators. The arc is concealed by a ceiling of colored lights. Swan's incandescent lamps are used for the staircases and the chambers where the valuables are kept. All the offices are connected with the head office by telephones, pneumatic tubes and telegraphs. The battery is controlled by electrical agency. The fifty elements are placed in the upper part of the edifice, as well as the tanks for keeping the liquid. When it is used it is collected by another tank placed in the lower part, from which it is carried by special carriages and brought to a special workshop at some distance. In this workshop the zinc is regenerated, as well as the sulphuric acid, and the sesqui-oxide of chromium is changed into chromate. The cycle of regeneration then is complete.

Waste Product.—Distillers' wash, which has hitherto been a source of annoyance, polluting water courses, or rendering the soil putrescent, has been turned to account by MM. Gaillet and Huet, for the production of a valuable artificial manure. The wash, immediately it leaves the still, is treated with perchlorate of iron, after being agitated with lime water. The lime precipitates the sesquioxide of iron, the ferric precipitate taking up nearly all the organic matter. The wash thus becomes a perfectly clear, colorless and inocuous fluid The deposit, or precipitate, is agglomerated into cakes, and forms a manure very rich in nitrogen and phosphoric acid, which more than pays the expenses of the process. Little space or labor is required, most of the operations being performed automatically.

Steel Pin with Iron Head.—A steel pin in a cast-iron cross-head is constructed in an ingenious way by Mr. Harris Tabor, superintendent of the Hartford Engineering Co., in this way: He takes a steel tube and turns it up true, and sets it in the sand before the cross-head is cast. The gate runs through this tube, and, of course, in filling the mold, "burns" the steel tube fast on the cast-iron core. Two ends are gained; the pin has a steel surface, which is a very good thing, and the turning is all accomplished before the cross-head is cast, so that, beyond a little cleaning up, no work need be done on it.—*Mech. Engineer.*

ITEMS OF INTEREST.

CALIFORNIA will have 2,024,009 acres in wheat this year.

BRADSTREET'S Journal estimates the cotton crop to be 5,020,000 bales.

SILK imports in 1880 were $32,000,000; home production $34,000,000.

THE Canadian marine department has given orders to light up the Lake beacons.

The French bill prohibiting importation of American pork into France is repealed.

THE imports of gold from Europe since August first are $26,416,162 against $78,346,286.

A PRESS is now being built in New York which will take off 200,000 impressions in an hour.

IT is said that the roes of various kinds of fish contain from about 30.000 to over 3,686,000 eggs.

THE last census shows that $4,863,063 was expended in Ohio in building and repairing fences in 1879.

THE United States Inspectors of steamers have been actively engaged in inspecting steamers at Cleveland.

THE total amount of all the property employed in the salmon fishing industry of the Columbia river, is valued at $2,000,000.

IT is estimated that 100,000 elephants are annually slaughtered to supply the world with ivory. England alone uses 30,000 tusks each year.

THE Edison Company are laying down 73,000 feet of wire in New York, and in one district alone are arranging for setting up 40,000 lamps.

QUITE a novelty in door knob alarums consists of a clock-work mechanism inside of the knob, which starts an alarum when turned, after being set.

HOLLAND'S process for running locomotives with naphtha for fuel, which was so enthusiastically heralded a year or so ago, has not yet proved successful.

THE cut of logs in the Run, St. Croix and Chippewa districts, Minn., is estimated to be 60 per cent below the average on account of warm weather and absence of snow.

THE steamer City of Dresden passed down Monday with 20,000,000 young whitefish from the Sandwitch hatchery, to be placed in Lake Erie.—*Detroit Marine News.*

IT is said that from 300 to 500 bushels of broom-corn seed can be raised per acre, under proper conditions; and certain Parisian chemists declare that fine flour can be manufactured from it, while the refuse is valuable as food.

A. M. STANLEY, Wilmington, N. C., has invented a machine for extracting pine oil from slabs and other pine refuse from mills. He claims that one cord of pine wood will yield 80 gallons of pine oil worth 25 cents per gallon.

AMONG the new industries recently introduced into Texas is goose growing. A flock of 1,600 birds has been received from Missouri and placed upon a separate ranche, the proprietor of which expects to realize considerable profit on his new venture.

A NEW YORK inventor, writing to one of the milling papers, says that his patent process of forcing oxygenated air through musty unsound wheat will completely dry it and remove all traces of unsoundness in eight hours, at an expense of $5 per 1,000 bushels.

THE three great ports of the world are London, Liverpool and New York. During 1880 they reached their highest trade figures, the imports being at London about $700,000,000, Liverpool $600,000,000, and New York $539,000,000.

"I CALL that very rare," said Jones to a workman who had done some work for him. "Ah!" answered the workman, highly pleased. "Yes," went on Jones, "rare, very rare, not half done." That cooked the workman, and he retired.

THE Scientific American gives the following as the analysis of a piece of modern English calico: Cotton, 53; china clay, 26; starch, 12; fatty matter, 2.5; chloride of magnesium, 2; chloride of zinc, 1.5; chloride of calcium, 0.5; moisture, 2.5: 100.

BASS & Co., the large brewers of Burton, England, have no fewer than 10 locomotives employed to do the hauling necessary about their various works.

THE Murgatroyd hoisting engine, says the Detroit *Marine News*, needs no stronger endorsement than the great demand for them on our larger class of steam barges owned by such men as the Winslows, Bradleys, Minch and others of our most careful managers.

IN one manufacturing village near Paris, where there are from 5,000 to 6,000 inhabitants, all the working people are engaged in making agate buttons, which, even with thirty per cent duty added to the cost, sell when imported into this country, at the extremely low figure of thirty-one cents per gross.

A CURIOUS fact shown by the census returns, and one which very few people are probably aware of is that the Southern mills manufacture finer goods on the average than the New England ones, getting eleven cents a yard for the goods turned out by them, whereas the New England mills get only eight and one-half cents.

IN a recent communication the secretary of the Manfacturing Chemists' Association of the United States gives incidentally some figures which strikingly exhibit the importance of chemical manufactures in this country. The capital invested is $85,000,000; the annual production is worth $118,000,000; the number of manufacturing establishments is 1,346, using 600,000 tons of coal, and employing 30,000 working people, whose wages amount to $12,000,000.

ALL kinds of coasting Atlantic vessels are doing remarkably well this year. Three-masted schooners which cost two years ago $25,000 are now readily sold at from $30,000 to $34,000. The dividends earned by well managed property of this class are rarely less than 15 per cent and frequently reach 25 per cent. The coal traffic between New York, Philadelphia, Baltimore and eastern cities is enormous, and is mainly carried in schooner bottoms.

THE census returns for 1880 give the following interesting figures regarding the wood-working industry of the United States: There are 65,000 establishments, employing 400,000 persons, and using material of the value of $350,000,000 yearly in the manufacture of articles of wood alone. Besides these there are over eight million workmen employed on articles constructed partially from wood, and using that material to the value of $6,000,000 yearly.

IT is asserted that another San Francisco industry has been ruined by the Chinese. A few years ago 400 Greeks and Italians used to fish in San Francisco Bay and supply the city market. Now less than one-third the number remain, and they have to go outside the head to find a fishing ground. It is charged that as soon as the Chinamen took a hand in the fishery business they introduced a very fine meshed net and in a short time cleared the fish out of the bay. The San Francisco fish supply is now derived principally from Monterey.

A MARBLE combination, of which ex-Governor Redfield Proctor is the representative, has purchased the Lincoln Iron Works, of Rutland, Vt., for $30,000. The present buildings are to be enlarged to twice their present capacity and refitted with new machinery.—*Boston Mfrs. Gazette.*

AMERICANS are becoming a nation of coffee drinkers. The consumption of tea per head of population has only increased from 1.01 to 1.44 pounds since 1867, while that of coffee in the same period has gone up from 6.11 to 8.89 pounds. Great Britain, on the other hand, drinks less coffee in proportion to population than a generation ago, while the consumption of tea has almost quadrupled in forty years.

WILD cherry is a wood for which a large demand has sprung up in the United States. In supplying the place of walnut, cherry is a very valuable wood and good care should be taken of the growing trees. It is used very extensively in making ebonized furniture. It has a very close grain, takes the best stain and is capable of high polish. Besides its use in furniture, cherry is used largely in the internal fittings of railway cars and public buildings.

REVIEWS.

Hubbard's Newspaper and Bank Directory of the World. NEW HAVEN, Conn: H. P. HUBBARD, Proprietor of the International Newspaper Agency.

Hubbard's Newspaper and Bank Directory of the World, in two large imposing volumes, is a wonderment for its completeness and comprehensiveness. Vol. 1 furnishes statistics of the press of the United States and of the British American Provinces, and Vol. II, those of foreign nations, together with a methodical list of the responsible banks of the world, which are shown to number about 20,000. This is far from summarising its contents. It is a journalistic representative work in every sense. The historic bulwarks of the press are portrayed, and its rise, progress and influence, with the mechanical and managerial organization that underlies it, as well as the distinctive features of class journalism, and the mode in which all interests are severally served, are most ably exhibited. Countries, States and Territories in which the press exists are delineated according to their geographical features, productions, trade and commercial relations, with existing communitions by land and water, all this being aided by illustrative maps admirably executed and by various statistical charts. The maps of the world with statistics of area and population will be found useful. The series of illustrations, including portraits, with brief, clear-cut, biographical pen-etchings of distinguished American editors and publishers, views of celebrated printing houses and fac-similes of ancient and modern newspapers, constitute most striking features. The "Story of the Types" is a brilliant as well as solid contribution to literature. In the specimens of typography given, we find not less than 160 different languages, including the Chinese. Sixteen pages are devoted to fac-similes of English, French, Spanish, Italian, Egyptian, South-American and Australasian newspapers, in miniature form, and which possess a curious interest. The descriptions of the different portions of the United States are from local residents, and are of practical value. We may add briefly that this is the only complete exhibit of the newspaper publications of all nations, an exhibit presented in English, German, French and Spanish, as well as of responsible banks. The prospectus states that it has taken a large force of correspondents, copyists, translators and writers fully seventeen months to collect, arrange, revise, prepare for the press, and supervise the printing of the matter required to fill the 2,593 pages in these two volumes. It is unapproachable as an exposition of the mode in which the press performs its function. Incidentally a vast body of information is introduced which we have not space to enumerate. We must commend the admirable character of the arrangement of its many departments, which allow of ready reference. The mechanical execution could not have been exceeded in attractiveness.

ADVANTAGES OF THE CRANK.—There are advantages of the crank that can not be equalled by any other contrivance for changing reciprocating to rotary motion in the steam engine. The delay or pause, or diminution of forward or backward motion, required at each end of the cylinder, is absolutely necessary to utilize the steam—to admit and exit the steam. There has never been a continuously acting (rotary) engine that economically approached the reciprocating rotating engine. The crank is not only not a hindrance to the economic use of steam, but it is a necessity to its economic use. Even the great pumping engines which were formerly modeled from the Cornish engines, have lately been modified to the crank engines, as giving better results than any reciprocating engines. The fact that for one hundred years of the life of the steam engine no substitute has been found for the crank, ought to be sufficient to convince all that the engineers of to day have not been sleeping, and that theory can raise questions unanswerable by logic but ignored by practice.—*Boston Jour. of Com.*

ELECTROTYPES of woodcuts are now advantageously made of nickel. The advantages over copper are the hardness, toughness, non-liability to oxidation and its proportionately low price. Although at present such nickel types cost twice as much as copper ones, they will stand ten times the number of impressions and allow the use of colors which would attack copper.

MINES AND MINING.

THE great copper Queen mine Bisbee, Col., shipped the other week $80,000 worth of ingots.

THE Silver City (Col.) mine near Lake San Christobal, has a 20 foot vein, with a concentrated streak of heavy cube galena, 24 inch wide. It is one of the most promising mines in the camp.

THE Colorado Anthracite Company, recently organized to develop the anthracite resources of Colorado, has a capital of $3,000,000, and is chiefly owned in Philadelphia. The amount paid in is $500,000.

THE Copper Queen, Bisbee, Ara., sold as a prospect for $4,500. The next sale was for $18,000. A smelter with development sold it next time for $1,200,000. The market value of the stock is now $1,600,000.

THE Ohio Central Coal Company is owner of about 13,000 acres of coal property located in Perry and Athens Counties, O., on which is now working twelve mines with a capacity of putting out 2,000,000 tons of coal per annum.

MINING for the precious metals is necessarily a business involving uncertainties. These uncertainties are of the nature of the business, and, as in a lottery, it is the blanks that make the prize. If rich deposits of gold and silver could be readily and certainly found and worked continuously, these metals would lose their value. But the uncertainties which attend the search for the precious metals do not prevent the business from being a legitimate one. They merely create a peculiar need for care, forethought, knowledge and prudent energy, which gives to these qualities large rewards. Pursued judiciously, mining for the precious metals should upon the average, return as good and sure a profit upon the capital invested as any other form of production, and there is no better and safer property than gold and silver mines, carefully selected and prudently worked.

IN the vicinity of Guerneville Cal., is the Great Eastern Quicksilver mine, at present employing 20 men and producing 100 flasks of metal per month; the Mt. Jackson mine, near by, is producing about 50 flasks per month. There are a number of other locations in the mountains but they are not worked on account of the low price of quicksilver.

THE product of the precious metals in the United States reached its highest point in 1877, when the mines of Nevada alone yielded $51,580,290—within a few hundred thousand dollars of the total product of all the states and territories in 1870. Since that time there has been a progressive decline in Nevada, where the product sunk to $15,031,621 last year; but a large increase in Colorado and Arizona. Utah has fallen off slightly, but Dakota more than makes up the deficiency, while the production of California remains at about the same figure, which it has now maintained for some years.

THE total mineral output of Arizona for 1881 was $12,171,707. Of this amount $9,608,695 was the production of gold and silver mines, and $1,563,011 of copper mines. The remaining $2,000,000 was the combined production of all the other branches of mining. And yet a few years ago Arizona was a barren waste a worthless territory.

THE length of the shaft and galleries in the Comstock mines of Nevada is 250 miles. Together they have produced $325,000,000 in bullion.

THE Hope Mining Company, of St. Louis, has paid a dividend of $12,000 and its future is assured. The stock $400,000 is held at par. The mines are in Montana.

COPPER ores are now shipped from Arizona to Baltimore for $18.70 per ton. It is worth $2,50 per unit at the works in Baltimore. This would be $125 per ton for 50 per cent. copper. Much of the Arizona and New Mexico copper will yield that much, the average being about 25 per cent. silver and gold contained is paid for besides. The St. Louis Smelting Works, it would seem, could provide for the need of such facilities nearer the mining regions. None of the Colorado smelters buy copper ores unless containing 25 ounces silver.

THE latest discovery is that of a vermillion mine of great extent in the Swisshelm mountains, Col. The ore comes out in a finely powdered state, and is a rich color between vermillion and carmine, and of the most tenacious sticking quality, better in fact than any of the mineral paints found in the market.

THE Warmington coal mine at Massillon, O., which has been abandoned because worked out, was opened by Rhodes & Co. of Cleveland, O., in 1875, since which time 400,000 tons of coal have been taken out.

SCIENCE AND INVENTION.

NOTICES OF APPROACH OF STORMS.—M. Defourcel has in the exposed court of his house two bars of iron planted in the earth, to each of which is fixed a conductor of coated wire, terminating in a telephonic receiver. He consults the apparatus several times a day, and never fails through its indications of earth currents to give notice of the approach of a storm 12 to 15 hours before it actually arrives.

RENDERING PETROLEUM SOLID.—A German, named Dittmar, has succeeded in converting liquid petroleum into a solid substance; and in Russia a company has been formed for carrying out the invention. The cost of making the conversion is very light, being much less than the cost of barrels at present. The solid petroleum can readily be converted into the fluid form for pouring into lamps. If this invention proves of practical utility for general purposes, it will work a vast revolution in the petroleum trade of the world.

PROTECTING IRON FROM CORROSION.—A recent invention by Mr. Lyte, of Putney, England, consists in an application of electricity for preventing the corrosion and consequent fouling of iron or steel ships, vessels or structures, by attaching to them suitably arranged conductors in such a manner that the said ship, vessels or structure when immersed in, or wetted by an electrolytic solution, sea water for example, shall become a cathode. The productive influence of studs or masses of zinc, or other metal electropositive to iron, attached to iron plates immersed in water or certain saline solutions, has been already tried and proved, but for certain reasons this arrangement has been hitherto neglected as being difficult of application, costly, and imperfect in its action. The dynamo electric machine has solved the difficulty.

A CHEAP VOLTAIC CELL.—In a paper read recently before the Glasgow Philosophical Society is a description of a new and cheap form of voltaic cell, which though not thoroughly tested, promises to be useful. Take an old tinned iron can—one that has contained preserved meats answers well—and place within it a porous cell, made preferably of earthenware, though a diaphragm of canvas will answer. Pack the space around the porous cell with iron borings or filings, which may be swept from the floor of an engineer's workshop. Fill the cell with a solution of commercial potassium hydroxide. Insert a strip of common zinc in the solution, connect the zinc and can with the wires of an electric bell, and a powerful current is at once indicated. The alkaline solution should be carefully preserved from the air by an air-tight stopper to the cell or other contrivance, but the iron borings should be fully exposed.

PISTON VALVES IN STEAM ENGINES.—J. W Plimpton, Oil City, Pa., has invented a piston slide valve consisting of a body having bearing surfaces or faces larger than the body, the steam passages being through the bearing surface and the body.

MARKETS.

FINANCIAL.

Office of TRADE REVIEW AND WESTERN MACHINIST.

FRIDAY EVENING, April 7.

Business at the banks has not been specially active. Loan rates on prime business paper are 7@8 per cent. Time loans are negotiated at 6 per cent. There is an improved demand for Eastern exchange, buying rates being at par and selling rates at 1.20 premium. A fair business has been done in local securities.

NEW YORK.—The local money market is a shade firmer, and 6 per cent. is not an infrequent rate for call loans on Stock Exchange collaterals. Transactions in stocks have been marked by less activity.

IRON.

Sales of American pig have been somewhat limited, the weakness in prices manifested causing buyers to hold off in anticipation of further depression. Makers are awaiting a revival of demand, which they think cannot be far off. Some of them, who have heretofore awaited inquiry, are making offers for future delivery. There has been but a moderate inquiry for English and Scotch pig, although these rule lower, American having the preference on the score of price We quote Coltness $26 to $26.50; Gartsherrie $25 to $26; Glengarnock $24 to $24.50; Summerlee $25.50; Carnbroe $24 50; Eglinton, $23 0) to $23.50. Scrap is quiet. It is easy to buy American Steel rails at concessions; purchases have been completed at prices equal to $53 at mill. Small lots of iron rails are selling at $47 to $51, but at the relative difference in price, buyers now show a preference for steel. For scrap the market is dull. In finished iron there is no sign of the falling off. Structural iron is firm and demand good. Mills have abundant work. Angles are 3, 2, beams 4, channels and lees, 4 2; refined at 3 1-4, shell at 3 1-2 to 4, flange 4 1-2. Manufacturers show unwillingness to meet buyers' views. Wrought pipe is 60 off, tubes 40; and lower quotations are looked for; the demand continues rather light. but the outlook is regarded as being very favorable for a good spring and summer trade. Discounts on gas and steam pipe 62 1-2 to 65 per cent.; on boiler tubes 40 to 40 and 5 per cent Oil well casing 70 cents per foot, net; do., tubing, 22 cents.

CINCINNATI.--(Reported by E. L. Harper & Co.) The market has ruled serene throughout the week. The attitude of buyers and sellers remain unchanged, the former demanding concessions, the latter decline, except such yieldings as have been granted by furnaces obliged to realize on their output being unable to bridge over the quiet season, and notwithstanding there are some reductions the orders of the week have been "hand to mouth." The leading producers are inclined to hold for prices ruling through March, placing confidence in an excellent crop and general activity of all industries.

CINCINNATI--(Reported by Rogers, Brown & Co) The condition of the market has not materially changed since the last report. Buying is restricted to small amounts through a general feeling among buyers that the chances for the future are in their favor. Facts, however, so far as this district is concerned, do not seem to support this. The leading furnaces are still running largely on old orders, and are not disposed to make important concessions. There is no accumulation of stocks, except at some of the Ohio stone coal furnaces, which are making prices from $1 to $2 per ton below the highest point reached in January. On the other hand, a wide convass of the Western market in the past ten days reveals generally low stocks among consumers. Many important buyers and most of the smaller ones must come into the market within the next 30 or 60 days, and the conditions are favorable, on a little revival of confidence for heavy buying and higher prices. We quote as follows, for 4 months: Hot Blast Foundry, Hanging Rock, C.C., No 1, $28.50@$29.50; No. 2, $27.50@$29.00; Southern, No. 1, $27.50@28.50; Strong Coke, No. 1, $26.50@27.50; No. 2, $25.00@26.50; No. 3, $24.00@26.00; Soft Stone coal No. 1, $24.50@26.50; No. 2, $23.50@$24.50. Forge--Strong, Neutral, No. 1 Mill, strong, $24.00@$25.00; Cold Short, No. 1 Mill. $23.00@24.50. Car Wheel and Malleable Hanging Rock Cold Blast, $35@38; Hanging Rock Warm Blast, $29@30; Southern Car Wheel Iron $35@38; Lake Superior, $34@36; Lake Superior Malleable, $34@36.

COPPER.

Orders are for small lots, and transactions few. We quote Lake Ingot at 18½@18¾c.

LEAD.

The market for lead is dull. The offerings are 4.90@5c. Consumers are watching to see the effect of arrival of large receipts.

SPELTER AND ZINC.

We quote Silesian and Western Spelter at 5½@5⅝c. Sheet zinc, which is somewhat scarce, is active at 7¼c@8c.

TIN AND TIN PLATES.

There is not much activity in tin; pig tin is quoted at 25c. cash for large lots; the jobbing trade is fair. For tin plates there is a moderate demand, and prices are steady at our quotations.

COAL.

Quotations are firm. Coal is arriving in considerable quantities, and additional vessels are being loaded. Freights are somewhat drooping; the belief with shippers that they have not touched their lowest restricts the number of charters. The following are quotations for present charters: Lake Michigan ports 75c., Detroit 40c., Marquette 60c, Portage 75c., Duluth, $1.00.

HARDWARE.

The hardware trade is active, the spring movement having been fully entered on. The demand for nails is increasing, and trade has been more active than last week; quotations are firm. The demand for barb wire is steadily increasing. Extensive sales are being made of mechanics' tools, also of agricultural implements. Sargent & Co. have issued a revised list of locks. The Association of pump manufacturers have adopted a discount of 45 per cent. for cistern and pitcher pumps; 35 per cent. for all brass hand force, including horizontal pumps; 25 per cent. for hydraulic rams, garden engines and boiler pumps, with stub rods; 45 per cent. for wind mill standards and 60 per cent. for working cylinders or lower sections. The Reading Hardware Company have determined not to change their list of locks, knobs, &c., of Sept. 20, 1881, discount remaining 40 per cent. and 2 per cent. for cash.

LUMBER.

The Cleveland lumber dealers are pressed with orders. The season is certain to be characterized by a continuously active demand. Prices are firm. Dealers are careful about prices for future delivery. Assortments cannot be filled from present stocks, and trade, heavy as it is, would be still larger were there full assortments. The weather is favorable to builders and general work, and large amounts of lumber are being used up at car works and for railway stations in this State. White pine, as well as yellow pine, have an improved yard sale. Spruce has an upward tendency. Choice hard woods are in very active request. The news from the mills is favorable for supply, especially where the haul is short.

WOOL.

Sales are moderate and prices irregular. In washed fleeces sales of choice No. 1 Ohio have been made in the Eastern markets at 46½@47c, and of Ohio X and XX at 42½@43c., choice Ohio XX, however, reaching 44½49c. There have been sales of cotted Ohio at 33c.

LUMBER.

PLANK, MIXED WIDTHS.

2 inch, 12, 14 and 16 feet, together.

A 1 and 2	$50
A 3	40
B	32
C	23
D	16
E	13

1¼ and 1½ inch.

A 1 and 2	$48
A 3	40
B select	32
C	23
D	16
E	13

BOARDS.

One Inch, mixed widths.

A 1 and 2 uppers	$44
A 3	36
B select	30
C	23
D	16
E	13

STOCK BOARDS.

12 Inches wide.

A 1 and 2	$45
A 3	38
B	32
C	24
D	16

STRIPS.

6 Inches wide.

A 1 and 2	$42
B	35
C	25
D	18
E	14
Norway Fencing Strips	18
Norway Flooring Strips	25

WORKED LUMBER

FLOORING.

Flooring—A 3	$43
B	38
C	34
D	30
Norway Flooring—A 3	28
C	22
D	18
Matched Drop Siding, 6 inches—A 3	42
B	38
C	34
D	30

Beaded Ceiling $2 higher than Flooring.

One half inch Bevel Siding—A 1 and 2	34
A 3	30
B	18
A Flooring—A 1 and 2	40

BILL STUFF.

Small, joists, 12, 14 and 16 feet	$16
18 feet and under	$17

Timber, larger than 8x8 special.

Long timber, 20 feet and over, adds about $1 per foot per M. to the price of short.

Cedar Posts, large	30 00
" " medium	25 00
" " small	$15 to 20 00

SHINGLES, LATH AND MILL WORK

Shingles XXX	$4 50
Clear Butts	3 50
Lath	3 00

Surfacing, one side, adds $1.50; two sides $2. Matching, flooring and drop siding, $2.50.

Michoacan Syndicate.

PROPERTIES.

Group of developed and producing gold and silver mines in District of Chapatuato.
Group of developed and producing silver mines in district of Ozumatlan.
Groupof undeveloped, working gold mines in district of Sinda.
Group of gold prospects in the district of Tiquio.

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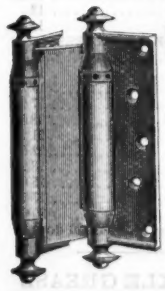
ONE NUMBER TWO

Cameron Steam Pump,

IN FAULTLESS CONDITION. APPLY TO

The California Powder Works,

184 Superior Street, Cleveland, Ohio.



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SPIRAL SPRING HINGE,

has the lightest and

Most Elastic Movement

Combined with

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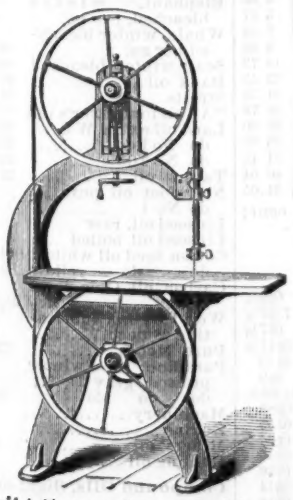

We build three sizes of this machine

with 26, 30 and 38 inch wheels.

The two smaller sizes will saw hard wood 12 in. thick, the largest 16 in. thick. They are made of the best material and are well made.

For further information address

FRANK & CO.,

Manufacturers of

WOOD WORKING MACHINERY,

176 Terrace Street, BUFFALO. N. Y.

For Sale.

Heavy Punch or Shears

Used for punching Railroad Fish Plates. Punches four holes at a time. Weight over Five tons. Good as new. Address

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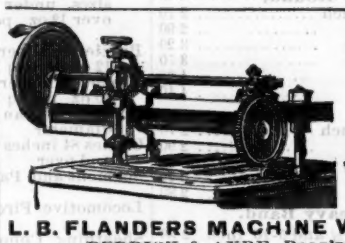
Cor. Superior and Bond Streets.



Steam Chest Seat Milling Machine

L. B. FLANDERS MACHINE WORKS,

PEDRICK & AYRE, PROP'RS,
1025 Hamilton Street, Philadelphia, Pa.
New Descriptive Circular on application.

HOLLAND & THOMPSON

Troy, New York,
Manufacturers of the

Holland Lubricator,

for lubricating the Valves & Cylinders of Steam Engines.

Operating with downward visible drop. The principle of this Lubricant is entirely new; being the only one manufactured operating with a downward visible drop, and does not conflict with any other patented Lubricator, being protected with Letters Patent, granted July 5, 1881. ☞ A saving of from 50 to 90 per cent in cost of oils. Send for Circular.

Portable Mulay Saw Mill,

With improvements recently made is unequaled as a neighborhood mill. It can be run by either steam or water power, and is especially adapted to the engines used for threshing.

It may be operated by either two or three men, and will cut as much lumber in proportion to the power and number of hands employed as mills of larger capacity.

It makes smooth and even lumber, leaves no stubshot, and will cut any sized log up to four feet in diameter. It may be transported from one locality to another and re-erected ready for sawing in from two to three days, and can be made profitable in localities where there is not sufficient timber to justify the erection of a large mill. Send for descriptive circular, price, etc., to

CHANDLER & TAYLOR, Indianapolis, Indiana

P.S.—We are also building a very superior Pony Circular Saw Mill suited to light power and medium sized logs.

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Successor to
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Manufacturer of Machine, Architectural and Ornamental

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and Machinery of all descriptions.
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☞ Special attention given to Marine jobbing.

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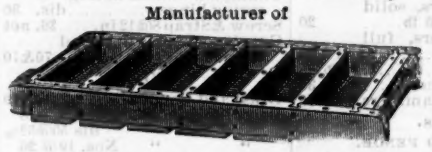

Brick Moulds, Off-bearing Trucks, Brick Wheelbarrows, &c.

All goods first class. Orders and correspondence solicited. NEW LONDON, O.

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2977 **MACHINES** 2977

NEW & SECOND-HAND

comprising
Machine and Blacksmith Tools of every description.
Woodworking Machinery in all its Branches, Portable Engines, Upright and Horizontal Stationary Engines. 1 to 300 horse power, Locomotive Fire-box, Upright Boilers, 1 to 100 horse power, Waterwheels, Cotton and Woolen Machinery, Steam Pumps, Grist Mill Machinery, &c., &c., &c.

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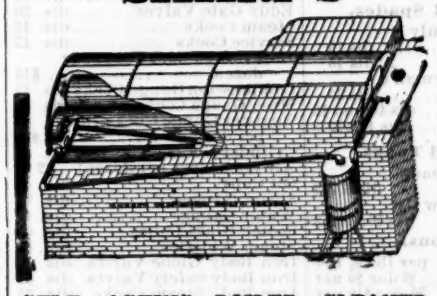
Branch Office and Wareroom, 209 Center Street, New York.

SHARP'S



SELF-ACTING BOILER CLEANER.

Patented November 23, 1880.

THOS. SHARP & CO.

SALEM, OHIO.

☞ Send for Circular and Price List.
[Mention this paper.]

THE MILLER CO.

Manufacturers of
THE TORRENT AND UNIQUE INDEPENDENT BOILER FEED

Steam Pumps,

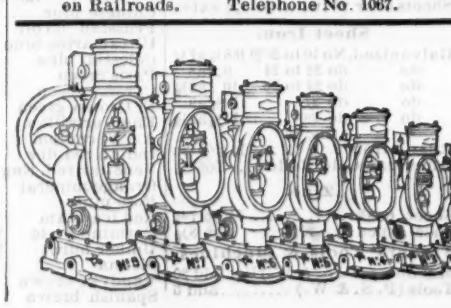
Canton, Ohio.

For Boilers of from 5 to 150 H.P., with Base, or Bracket on smaller sizes! Price $30 and upwards. Small sizes indispensable for Farm and traction engines. Also make a specialty of all kinds of castings. Send for new 1882 Catalogue.

AGENTS WANTED

EVERYWHERE to sell the best Patented Saw Filer made. *With* it an apprentice can file a saw as well as the best expert *without*. They sell on their MERITS. Secure exclusive territory and BIG Profits.

J. A. Lannert, Cleveland, O.



The Steam Pumps

Made by Valley Machine Co., Easthampton, Mass., are the Best in the World for Boiler Feeding and other purpose.

G. M. HEARD & CO.

Gold, Silver & Nickel Platers

109 Ontario Street.
CLEVELAND, O.

B. F. Roberts,

BOILER MAKER,

And Sheet Iron Worker.

BRIDGE STREET, SPRINGFIELD, OHIO

Special attention paid to taking out and Piecing Portable Flues.

☞ Orders by mail to B. F. Roberts, Springfield, Ohio, promptly attended to.

E. F. ENSIGN,

JOBBER OF

Agricultural Implements,

WAGONS, FERTILIZERS, SEEDS, &C.

The Empire Grain and Fertilizer Drill and Twine Binding Harvesters Specialties.

Springfield Brass Foundry.

Pattern and Model Work a Specialty.

Castings done in White Metal, Brass, Zinc, Type Metal, Pig Lead, Pig Tin, Bar Lead, Bar Tin, Antimony, Copper, Spelter, &c., &c.

Cash paid for Old Brass and Copper

McLAUGHLIN & SHILLING.

68 South Limestone Street,
SPRINGFIELD, O.

PURE PREMIUM BONE.

The tried and never failing Fertilizer in all grains and grass crops. It has proved its value as such by years of actual use all over the world. Circulars and Price List free. Address all letters pertaining to the purchase of Premium Bone, or the sale of bones, to **Excelsior Fertilizer Works,** Salem, Columbiana County Ohio.

Cleveland Wholesale Prices.

HARDWARE.

Adzes.

Carpenter's	per doz	$16 80
Ship	" "	18 75
Heavy railroad	" "	19 50

Axes.

Hunt's	℔ doz	$ 9 50
Lippincott's Crown	℔ doz	9 00
Cut More	℔ doz	9 00
Peck's Double Bit	℔ doz	22 00
" Champion Blade	℔ doz	11 00

Anvils.

Eagle, Amer.	per lb. 10c dis 15
Wright's	11½c@12c
Armitage's Mouse Hole	9⅛@9½c
Trenton	10½c
Wilkinson's	10c

Animal Pokes.

Berea, per doz	4 00
Eagle, per doz	5 00

Apple Parers.

Domestic & Reading	℔ doz $7 50
Turn Table	6 00

Cleveland Stamped Elbows

Genuine Russia Iron

4	inch per doz	4 50
4½	do do	5 50
5	do do	7 50
5½	do do	8 50
6	do do	9 50
7	do do	11 00

Planished American Russia Iron

4	inch, per doz	4 00
4½	do do	5 00
5	do do	6 50
5½	do do	7 50
6	do do	8 50
7	do do	9 50

Charcoal Iron

4	inch, per doz	2 00
4½	do do	2 50
5	do do	3 50
5½	do do	4 00
6	do do	4 50
7	do do	5 50

25 per cent

Augurs and Bits.

	Dis
C S cut augurs	40@10
do do do bits	40@10
D C gimlet do	$6.00 Gross
Sneils	@40
Russell Jennings'	10 10@10
Cook's pat augur	40@10@50
Post hole, net	℔ doz $21@24

Balances.

	Dis
Stillon's, Frary's, Morton's	15 10 per ct

Bellows.

	Dis
Blacksmith's com new list, 40	ct
Mortimer's new list, dis 40	℔ cent
Hand, new list, 40 per cent	

Bolts.

	Dis
Carriage and tire, com	80
do do Norway	65
Stove	40
Plow	30
Wagon	40
Machine & Square head	55
Skein,	55
Bolt ends,	55
Lag,	55
Tap,	55

Butts.

	Dis
Wrought brass	65
Cast, loose joint	40&10
Pin, japnnned and silver tipped	45&10
Wrought, fast joint narrow	40&10
Wrought fast joint broad	45&10
Wrought loose joint broad	45&10
Wrought table and back flaps	40&10
Loose pin, reversible	45&10
Brass kettles—per lb	32@35

Chains.

Coil by cask,

3-16	¼	5-16	⅜	7-16	½
10¾	9	8	7	6¾	6¼

Crucibles.

Per number	4@ 4½

Clothes Wringers

Keystone per doz	42@45

Chisels.

	Dis
Hot and cold cutting	℔ lb $ 30
Railroad track	30
Machinists	30
Chipping, mallet head	50
Cape	50
Packing	50
Stone cutters	50

Crowbars.

Steel point	℔ lb $ 5
Solid steel	8

Drawing Knives.

	Discount.
Witherby's	60@10 ℔ cent
Barton's	15
Adjustable handle	10

Emery.

Genuine Chester	7@ 8
Wellington	10@12

Files.

Auburn	$5 to £ dis 35 pr cent
E. M. Boynton's, new list	dis 25
J. & Riley Carr	4.50 to £
Johnson & Bro	4.50 to £
Butcher's	dis 30
Walter Spencer & Co.'s	4.50 to £
" Diamond"	4.50 to £
Fisher's	4.75 to £
Moss & Gamble	4.50 to £
H. Disston & Sons (new list)	dis 40 per cent
Heller Bros.' Horse Rasps	
Nelson	dis 30
New American	dis 40
Union File Co	dis 40

Horse Rasps.

Heller's	dis per cent 30
"Arcade"	50 & 20

Harrow Teeth.

Iron ⅝ to 1 inch	per lb 3¼c
Steel, square	4¾c

Hammers.

Mason's stone hammers, steel faced and pene	℔ lb 15
Mason's stone hammers, solid cast steel	25
B. S. Napping hammers	30
Striking hammers, solid cast steel, 5 to 25 lb	20
Drilling hammers, solid cast steel, 3 to 6 lb	20
Turning hammers, full polished	each 2 00
Set hammers	℔ lb 35
Creasing hammers	35
Ordinary bush hammers	55

Nails.

BRADS AND FENCE.

10 to 60d	
8 and 9d advance	3 40
6 and 7d	25
4 and 5d do	50
3d	75
2d	1 50
3d fine	2 75
2d fine	3 00
⅞ inch	3 75
4d barrel	3 00
1¼ inch barrel nails	1 00
1⅛ do do do	1 50
1 do do do	1 75
¾ do do do	2 50
Cut spikes, all sizes	3 00
Clinch nails, all sizes	25
Casing and box nails 75 cts advance	1 75
Finishing nails, $1 25 do	
Tobacco nails, 50 cts do	

Nuts and Washers

	Dis
Nuts	7
Washers	6

Picks.

Railroad, 4 to 5 lbs doz	$7 75
5 to 6 lbs	7 75
to 7 lbs	8 50
7 to 8 lbs	9 50
Railroad Tamping Pick 7 to 8 lbs. doz	13 50
Mill Picks per lb	75c

Rivets.

Iron	
Tinned	dis 40
Copper	dis 40
	dis 33⅓

Squares.

	Dis
Steel or iron, case lots	50
Try squares and T bevels	40

Spikes—WROUGHT

All lengths by ¼ inch	4½c
do do do 5–16	3½
do do do ⅜, 7-16 & ½ in	3¼

Shovels and Spades.

Ames' new list, July 1, 1881,	
Old Colony	dis 15
Remington's (Lowman's Patent)	dis 15
Rowland's	dis 30
Griffiths	dis 40 and 10
	dis 40&10

Shovels and Tongs.

Iron and Brass Head, R. & E. list	dis 60&2
Polished Steel, new list	dis 50&10&2

Sad Irons.

From 4 to 10 lbs	per lb 3¼ net
Self-Heating	℔ doz $9 net
" Tailors	℔ doz $18 net
Gleason's Shield and Toilet	dis 25
Mrs. Pott's Irons, double pointed	dis 40
Mrs. Pott's Irons, square back	45 dis
Enterprise Star Irons	45 dis
Comoined Fluter and Sad Iron	℔ doz $15, dis 15

Saw Sets.

Boynton's patent X Cut, per doz $12; Hand Saw, per doz $10	dis 20
Stillman's Genuine, per doz $3 50 and $5 50	dis 20
Stillman's Imitation, per doz $3 25	dis 20&10
Common Lever, per doz $2	dis 30&10
Leach's No. 0 $8; No. 1 $15;	dis 15
Hammer, Hotchkiss $5 50, dis 10	
" Bemis & Call Co.'s new patent	dis 40&5
Bemis & Call Co.'s Lever and Spring Hammer	dis 30&5
Bemis & Call Co.'s Plate	dis 10
" Cross-cut	dis 12½
Aiken's Genuine $13, dis 50&10	
" Imitation $7, dis 50	
Hart's Patent Lever	dis 20
Disston's Circular	dis 40

Scales.

	Dis
Fairbanks'	25

Screws.

	Dis
Flat head iron or steel per cent dis	30
Flat head brass	30
Round head iron or steel	25
Round head brass	20
Coach or lag	55 ℔ ct

Tank Iron.

3-16, ¼ and ⅝ inch thick	3 20

Tacks.

	Dis
Black	30—10
Tin'd	55—10

Traps.

	Dis
New House	30
Peck, Stow & Co	50—10

Vises.

Solid box, Dis	40

Wrenches.

Coe's genuine	40 & 10
Coe's imitation wrought bar	60
Mechanics'	60 and 10

Bag Holders.

Sprengle's Pat, $18.00 per doz 40 per cent. dis.	

Planes.

Ohio Tool Co	dis 25
Sciota	dis 30
Bailey's Pat. Adjustable	dis 25

Rules.

Stanley	dis 66⅔ and 10

Sash Locks. Discount.

Payson Mnfg. Co. "Perfect"	42
Simmons' Sash Supporters	20

Hinges.

Champion double acting spring hinges	dis. 30
Screw & Strap 8@12 in.	$6. net
Gravity Locking Blind Hinges, Sargeant & Co.	70&10

Wire.

Brass and Copper	dis 20
Bright & annealed, Nos. 0 @ 18	dis 50@52½
" " Nos. 19 @ 26	dis 60
" " Nos. 27 @ 36	dis 65
Coppered Nos. 0 @ 18, dis 45	
Galvanized, Nos. 0 @ 18, market list,	dis 40@45
Tinned, Nos. 0 @ 18,	dis 40@45
Cast steel	dis 40
Tinned Broom Wire, Nos. 18 @ 25	dis 55
Annealed Fence, Nos. 8 and 9	℔ lb 7¼c
Annealed Grape, Nos. 10 to 14	℔ lb 8¼c
Galvanized Telegraph, Nos. 7 to 9	℔ lb 10¼c
Galvanized Telegraph, Nos. 10 to 11	℔ lb 10¼c
Galvanized Telegraph, No 12	℔ lb 5½@5¾c
Fence staples	
Fence Staples, galvanized,	℔ lb 7@7¼c
Stubs Steel Wire	$7 00 to £
Barb Wire, painted	8¼c
Barb Wire, galvanized	9¼c
Crucible Steel Ropes from ¾ in. at 9c to 1¼ in. at	52c
Best Selected Iron Ropes from 3-16 in. at 3c. to 1¼ in. at	33c

Gas and Steam Fitters' and Machinists' Supplies.

Gas and Steam Pipe—See Pipe	
Wrought.	
Enameled Pipe	dis 65
Artesian Well Casing	net list
Hydraulic Tubes	net list
Malleable Iron Fittings	net list
Cast Iron Fittings	net list
Globe Valves	dis. 55
Angle Valves	dis. 50
Check Valves	dis. 45
Safety Valves	dis. 45
Eddy Gate Valves	dis. 45
Steam Cocks	dis. 20
Service Cocks	dis. 45
Ball Gauge Cocks (net per dozen)	dis. 45
Compression Gauge Cocks	$15
Miss. Gauge Cocks	dis. 45
Register Gauge Cocks (net per dozen)	dis. 45
Cylinder Cocks	$15
Air Cocks (net per dozen)	dis. 45
Oil Cups	$2 75
Steam Gauges	dis. 45
Water Gauges	dis. 35
Scotch Glass Tubes	dis. 45
Steam Whistles	dis. 60
Iron Body Globe Valves	dis. 45
Iron Body Safety Valves	dis. 55
Iron Body Steam Cocks	dis. 55
Pipe Tools	special
Globe, Angle and Check Valves (Powell's regrinding)	dis. 45
Guarantee "Jet Pumps"	dis 40
Mack's Injectors	dis. 25

Boiler Plates.

("Gaylord"—Standard Quality.)

C. No. 1	4 50
C. H. No. 1 Shell	4 60
C. H. No. 1, 50,000	5 00
C. H. No. 1, 55,000	5 50
C. H. No. 1 Flange	6 00
Firebox	
T. S., 60,000 (as per)	6 00
T. S., 65,000 (act of)	
Homo. Steel, 70,000 (of Cong)	8 00
Heads, ¼c ℔ lb. extra.	

N.B.—Eastern brands of boiler plate at from 2-10 to 3-10c ℔ lb less than above prices.

Boiler Rivets—"Albany."

⅛, ¾, 11-16, and ¾ in. diam. 5 50

Sheet and Tank Rivets.

"Norway."

All sizes	dis. 15

Nuts, Bolts, etc.

Square & Hex. Nuts	7 off list
Washers	6 off list
Machine Bolts	dis 55
Bolt Ends	dis 55
Boiler Patch Bolts	dis 55
	net list

Boiler Tubes.

"National" Standard Gauge 1 inch to 10 inch	dis 37½
"National" Standard Gauge 11 inch to 15 inch	dis 25
"National" Special Locomotive Tubes	net list

Boiler Makers' Tools.

Doty's Power Shears	net list
" Hand Lever Shears	net list
" Power Punch	net list
" Hand Punch	net list
Steel Screw Punch	net list
Iron Screw Punch	net list
Boiler Plate Rolls	net list
Buffalo Forges & Blowers	dis 20
Watson's " "	net list
Spring Tube Expander	dis 15
Roller Tube Expander	net list
National Tube Cleaner	dis 20
Wire Flue Brushes	net list
Anvils—"PeterWright"	12½ ℔ lb
Solid Box Vises	net list

IRON AND STEEL.

Flat Bar.

1½ to 4 by ⅛ to 1 inch	2 70
4¼ to 6 by ⅛ to 1 inch	2 80
1¾ to 6 by 1¼ to 1½ inch	2 80
1¼ & 1½ by ⅜ to ¾	3 15
1 & 1¼ by ⅜ to ¾	2 80
⅛ ¾ and ⅞ by ⅜ to ½	2 90
	3 15

Round.

1 to 1¾ inch	2 70
2 to 2¾	2 90
2¾ to 3¼	3 20
3¾ to 4	3 70
4¼ to 4½	4 20
4¾ to 5	4 40

Square.

1 to 1¾ inch	2 70
2 to 2¾	2 90
2¾ to 3¼	3 20
3¾ to 4	3 70
¾ to ⅞	2 80

Heavy Band.

1½ to 6 by ⅛ and 5-16 inch	2 90
1 to 1¾ by ¼ and 5-16 do	2 95
⅜ to ⅞ by ¼ and 5-16 do	3 00
⅜ to ½ by ¼ and 5-16 do	3 80

Half Oval and Half Round.

Wagon box iron ⅜ and ⅞	3 95

1-10c per lb extra will be charged for cutting to specified lengths

Light Band.

1½ to 2¾ by ½ to 3-16	3 25

Hoops.

1¼ to 2 , Nos 18 to 18	3 90
2¼ to 3½ do 18 to 15	3 80

1-10 extra for each gauge lighter

Sheet Iron.

No 22 to 24	4 50
No 25 to 26	4 30 offd. 4 50 asked
No 27	4 90
No 28	4 85

English Steel.

Best cast	℔ lb 15½c
Extra cast	16½c
Round machinery, cast	1c
Swaged, cast	18c
Best double shear	15½c
Blister, 1st quality	13c
Refined tool steel	16½c
Spring calking	7¼@7¾c
German steel, best	11c
2d quality	10c
3d quality	9c
Sheet cast steel, 1st quality	15½c
2d quality	14½c
3d quality	12½c

American Steel.

Best brands of refined cast steel	12c
Crucible machinery	8c
Open-hearth ditto	5c
Hammer cast steel	9½c
Spring cast steel	7½c
Bessemer and open-hearth spring	5½c
Ditto plow	5½c
Steel boiler plate	6½@7c
Bessemer machinery	5 @6c
Spring and calking	7¼@7½c
Tire	4 @4½c
Sleigh shoes	3½@3¾c

Bessemer Steel Tire.

⅞ to 1 by 3-32	4½ ℔ lb
⅞ to 1 by ⅛ to 5-32	4½ ℔ lb
⅞ to 1 by 3-16 to ¼	4½ ℔ lb

Miscellaneous Cast Steel.

Auger and auger bit	8
Axle steel for wagons	8
Frog points and plates	9
Frog size bars	7½
Pick, plain	8½
Pick, and Mattock, beveled	8½
Skate steel	8½
Table cutlery	8½
Trap spring steel	9
Pike and cant hook	8½
Coal and granite wedge	

TINNER'S STOCK.

Tin Plate.

10x14 IC charcoal	$6 25
do IX do	8 25
12x12 IC do	6 00
do IX do	8 50
14x20 IC do	6 50
do IX do	$6 25@7 50
DC, 12½x17 do	6 00
DX 12½x17 do	8 00

For each additional X add 2 00

IC 10x14 } coke	$5 75@5 50
IC 12x12 do	6 00@5 75

Tin.

Banca	per lb. 28c
Straits	" 25c
English	" 25c
Spot Tin	" 25c

Solder.

½ and ½	16½c
Extra	15½c
No. 1	13½c

Pat Planished Sheet Iron.

{A}	per lb 10¼c
{B}	9¾c

Nos	10	15	21	25
to	14	20	24	& 26
Com	3-60	3-80	4-00	4-20
Char	5-60	5-60	6-00	6-20

Sheets over 28 in. wide ¼c extra

Sheet Iron.

Galvanized,	No 10 to 20	℔ lb 8¼@7¼
do	do 22 to 24	9 @8
do	do 25 to 26	10 @8¼
do	do 27	10¼@9
do	do 28	11¼@9¼
	dis, 40	
Russia Iron		12½@12c
American Cold Rolled		5@7½

Zinc.

Sheet, cask	7½@ 7¾
Sheet, open	8@ 8½

Tinners' Tools & Machines.

Machines (P. S. & W.) list add	20
Tools (P. S. & W.)	add 6

COPPER.

Lake Ingot	19@19¼c
Baltimore	19c
Arizona	18¾c

Sheathing Braziers Copper, Bolts, &c.

Brazier's Copper, ordinary sizes, 16 oz. per sq. foot, and over per lb	30c
Brazier's Copper, ordinary sizes, under 16 oz. and over 12 oz. per sq. foot, per lb.	32c
Brazier's Copper, 10 oz. and 12 oz. per sq. ft. per lb.	34c
Brazier's Copper lighter than 10 oz. per sq. ft. per lb.	36c
Circles less than 84 inches in diameter per lb.	33c
Circles 84 inches in diameter and over per lb.	30c
Segment and Pattern sheets per lb.	33c
Locomotive Fire Box sheets per lb.	30c
Sheathing Copper, over 12 oz. per sq. ft. per lb.	28c
Bolt Copper per lb.	30c
Copper Bottoms per lb.	31@32c

No copper is Sheathing except 14x10 inches, and not to exceed 34 oz. to the sq. ft.

Tinning.

14x18	per sheet 6c

All other size sheets, 2½c per square foot For tinning both sides, double the above amount.

BRASS.

Cash prices for Roll and Sheet Brass For less quantity than 100 lbs. add 3c per lb.

High Brass.

All Nos not thinner than to No 28, wider than 2 in. not wider than 14 inch	30c
All Nos to Mo. 28, inclusive, and widihs over 14 to 20 in. inclusive	35c
All Nos to No 28, inclusive, and widths over 20 to 30 in. inclusive	38c

½c per lb. advance on each No above Nos. 28 to 38, inclusive.

All Brass thinner than No. 8 is Platers' Brass at 53c

Sheets 24x48, and all sheets cut to particular sizes and lengths under 30 inches, in width wider than 2 inches 37c

Low Brass.

4c per lb. more than High Brass. Gilding metal 8c per lb. more than High Brass.

Platers' or Gold Metal

In Bars	48c
Sawed	51c
Planed or Polished	54c

For Slitting.

Metal in width in. to ⅛ in. to No 28, inclusive, 1c per lb advance	
Metal, in width 2 in. to 1 in, thinner than No. 28, 2c per lb. advance.	
Metal, in width ⅛ in. to ¼ in. thinner than No. 28, 5c per lb. advance.	
Metal ¼ in. in width and less, 10c per lb. advance.	

Any of the above widths cut to particular lengths, add 7c per pound.

PIPE, WROUGHT.

Standard Wrought Iron Lap Welded Steam and Gas Pipe.

Inside Diameter. Inches.	Plain, Price Per Foot.	Galvan or Enameled Per Foot.	Outside Diameter Inches.	Weight Per Foot.
⅛	08		.40	.24
¼	08	$0 11	.54	.42
⅜	09	12	.67	.56
½	11	15	.84	.85
¾	13½	19	1.05	1.13
1	19	28	1.31	1.67
1¼	27	40	1.66	2.26
1½	33	47	1.90	2.69
2	46	64	2.37	3.66
2½	75	1 00	2.87	5.77
3	95	1 30	3.50	7.55
3½	1 25	1 70	4 00	9 05
4	1 50	2 05	4 50	10.73
4½	1 75	2 40	5.00	12.49
5	2 25	3 00	5.56	14.56
6	3 75	4 00	6.62	18.76
7	3 75		7.62	23.00
8	4 75		8.62	28.00
9	6 50		9.68	34.40
10	8 00		10.75	40.64
12	12 00			54.65

Discount, plain, 55 per cent; galvanized, 52½ per cent.

PAINTS.

White Lead, Eng. oil	9	@9½
do. American do.	7	@7¼
do do dry		@7¼
White Zinc F. oil	10	@11¼
do do dry	8	@10
do American. oil		@9
do do dry		5½@6¼
Chinese blue	℔ lb 75	@80
Prussian do oil	do 45	@55
Ultramarine blue	do 18	@30
Celestial blue	do 8	@30
Paris green	do 25	@30
Chrome green	do 8	@10
Fr Crown green	do 16	@14
Eng Vermillion	do 55	@18
Am Vermilion	do 15	@60
Indian red dry	do 9	@22
Venedian red, Eng	do 1¼	@12
Orange mineral	do 10	@2
Rose pink	do	@14
Red lead, Am	do 10	@13
Carmine No 40	do	@ 7¼
Umber burnt	℔ oz 60	@75
Sienna	℔ lb 4	@ 8
Vandyke brown	do 4	@15
Spanish brown	do 10	@12
	do	@ 1¼

SCRAP IRON AND OLD METAL

DEALER'S SELLING PRICES.

	Net Tons.
No. 1 wrought scrap	$28@29
Sheet and hoop "	13@13
Cast scrap, (No. 1 heavy)	19@21
Cast Scrap (Stove Plate)	14@15

OLD METALS.

Old copper per lb	16c
No. 1 H. Brass per lb	10
Heavy yellow Brass do	12
Light Brass per lb	10
Scrap Zinc per lb	@4
Tea Lead per lb	@4¼
Heavy Lead per lb	4½@5

LEAD.

American, ℔ lb	5¾@6c
Bar, ℔ lb	7c net
Pipe, ℔ lb	7½c dis 10 per ct
Sheet, ℔ lb	8c dis 10 per ct
Tin-lined pipe ℔ lb	15c dis 10 per ct
Shot Drop 7c; Buck	8c
Chilled Shot	8c

Babbitt Metal.

N. P. U. ℔ lb	@9c
A. 28c., B. 25c., C. 15c.	

COAL,

WHOLESALE.

Wholesale f.o.b vessel at Cleveland:	
Carbon Hill and Monday Creek	$2 65
Massillon	2 85
Brier Hill	3 50@3 75
Pittsburgh	3 00
Salineville	2 50
Tuscarawas	2 25

RETAIL.—Delivered.

Massillon Lump	$4 25
" Nut	3 75
Carbon Hill and Monday Creek, lump	4 00
Carbon Hill and Monday Creek, nut	3 75

75c less on cars by car load.

Anthracite Stove and Chestnut	7 75
Egg and grate	6 00

Hides and Leather.

Prime cured hides,	7½@7¾
Green hides	6@6½
Bull, scrubby, badly scored or damaged, cured, two-thirds price.	
Prime dry hides	13@14
Horse hides, green	$1 75@2 00
Horse hides, dry	$2 00@2 25
Prime cured veal calf,	12½
Prime Deacon Skins, salted	60c
Pelts, wool on	32@34
Fresh slaughter sheep	30@31 35
Fresh slaughter lambs	50@60
Green calf skins	
Hemlock rough	13
Oak rough	23@24
Oak sole	25@26
Union harness	37@40
	32@35

GLASS.

(Per box of 50 feet)

SINGLE THICKNESS

6x8 to 10x15	7 50
11x14 to 15x24	8 50
16x24 to 20x28	9 75
15x34 to 24x30	10 75
26x28 to 24x36	11 50
26x36 to 26x44	13
26x46 to 30x50	14 00

DOUBLE THICKNESS

6x8 to 10x15	11 7
11x14 to 15x24	13 25
16x24 to 20x28	15 75
15x34 to 24x30	17 25
26x28 to 24x36	18 50
26x36 to 26x44	21 25
30x50	22 50
30x52 to 30x54	23 25
30x56 to 34x56	25 00
34x58 to 34x60	27 75
36x60 to 40x60	30 00
Dis 60 & 15 single, 60 & 20 double	

OILS & AXLE GREASE

Pure Oils. packages included

Sperm, winter bleached per gal	@1 15
Elephant, winter bleached, per gal	@ 70
Whale, winter bleached per gal	60@ 65
Sealr winter bleached	80@ 85
Bank oil	48 @ 51
Straits	50 @ 53
"A" oil for tanner's use	35 @ 40
Lard oil extra W S	90 @ 95
do No 1 do	76 @ 79
do No 2 do	63 @ 66
Tallow oil	65 @ 73
Neatsfoot oil pure	1 05
do No 1	90
Linseed oil, raw	@ 60
Linseed oil boiled	63
Cotton seed oil white	64 @ 66
do do yellow	60 @ 63
Carbon oil Ohio legal test	9½@11¼
West Virginia lubricating 28 deg	@ 29
Pure Mecca	55@ 50
Paraffine oil winter pressed grav 25	25@ 30
do do do	40
Machinery	40
Engine	50
Miners' oil	40@45
Drilling oil	40

Compound Oils, (light color'd)

No 1 Sperm signal oil	65@ 68
No 2 do do	58@ 63
No 1 wool and spindle oil	40@ 50
Golden machinery oil	30@ 35
No 2 Mecca (dark colored)	20@ 30

Axle Grease (light colored per gross

	7 50@ 8 00
Tallow, prime	8¼@8½
Tallow, dark and No. 2	6¼
Beeswax	20@

Cleveland Business Directory.

Assayers and Analytical Chemists.

JUDSON, W, E, Analytical Chemist, 8 Cushing Block.

Bolt and Nut Works.

HOTCHKISS & GAYLORD, manuf'rs. Machine, Plow & Elevator Bolts, Coach Screws.

Boiler Makers.

SMITH & TEACHOUT—(Established 1857.) Boiler, Tanks, Stills etc. 439 Broadway.

Bridge Builders.

BUCKEYE BRIDGE AND BOILER WORKS mfrs of Arch & Truss Bridges, Boiler Tanks and Oil Stills. Bet. Wasson st. and Case Ave.

Coal and Iron Exchange.

JACKSON IRON CO. Iron Ore and Pig Iron. Rooms 8 and 9. Fayette Brown, Gen. Agent.

RHODES & CO. Coal, Iron Ore an Pig Iron. Rooms 1 and 2.

Carriage Blacksmith.

STRIEBEL, CHAS. manfac'r. of Carriages and Wagons and platform trucks. Horse shoeing and general blacksmithing .93 Woodland ave.

Carriage Bolts.

THE COLWELL & COLLINS NORWAY BOLT CO., manufacturers of Philadelphia Carriage and Tire Bolts.

Church and School Furnture.

FAULHABER, GEO. manufacturer of School and Church Furniture. Fine Hard Wood work a specialty. 203 Ontario Street.

Custom Boots and Shoes.

ROONEY, JOHN manufacturer of hand-made Boots & Shoes, custom made and warranted 17 Ontario Street.

Carriage Repository.

GREENE'S, J. O., Carriage Repository, 408 Superior street and 52, 54 & 56 Rockwell street, dealer in Fine Carriages. Repair shop in connection.

SLATER, G. A., Carriage dealer, sells the best work for the lowest price. A fine assortment always on hand. Repository 365 Euclid Avenue

Coal and Pig Iron.

ANDREWS, HITCHCOCK & CO., Briar Hill Coal and Pig Iron. 122 Water Street.

Distillers.

BLOCH, S. H. & E., Distillers, and wholesale dealers in Kentucky Whiskies. 66 Water St.

Electrical,

ELECTRIC SUPPLY CO. manfrs and dealers in Electric Burglar Alarms, Anunciators, Cell Bells and Batteries. Telephone lines built and repaired. 145 Seneca Street.

Fresco Artists.

KEMMER & KUSHMAN DECORATIVE CO., Fresco Artists, Fine Modern Wall Papers. 358 Euclid ave.

Foundries.

BOWLER & CO., Car Wheels, Patent Chilled Frogs, and all kinds of castings. 9 Winter.

CLEVELAND MALLEABLE IRON CO., manufacturers Malleable Iron Castins.

LAKE SHORE FOUNDRY, Water and Gas Pipe, Light and Heavy Castings. Alabama st.

TAYLOR & BOGGIS, successors to H. & H. F. Taylor, Iron Founders, 65 to 73 Central Way.

VIADUCT FOUNDRY COM'Y, Aenis, Carlin & Strangward manfrs of Machinery Castings Fine Light Castings a Specialty. Office & Works 11 13 15 and 17 Detroit Strert, near Center.

ECLIPSE IRON WORKS manufacture Castings of all kinds. Cor. Center & Winslow Sts

FITZSIMONS WM. & SON, Rolling Mill and Machinery castings. Rolls a Specialty. No. 435 Broadway.

File and Saw Works.

PARKIN, W. H. & CO., Hand-cut Files and Raspe, dealers in Disston's saws, 11 So. Water

Grindstones.

OHIO GRINDSTONE CO. manufacturers of and dealers in Grindstones. 127 Superior st.

Hotels.

FOREST CITY HOUSE, cor. Public Square and Superior st., Terrill & Ingersoll, Props.

KENNARD HOUSE, D. McClasky, Prop.

NEW ENGLAND HOTEL Water st., W. W. Wolcott, Prop. Refitted and refurnished.

STRIEBINGER HOUSE, between Ontario and Seneca sts. $2.00 per day. Hawley & Langton

CITY HOTEL, Seneca street. H. B. West, proprietor. $1.50 per day.

Hides, Pelts and Leather.

DENNISON BROS., dealers in Hides, Pelts, Furs and Tallow, 48 and 50 River street.

Hardwood Lumber.

MARTIN, J. T. dealer in Hardwood Lumber, Stone's Levee, near Central Way.

Lumber.

WOODS, PERRY & CO., manufacturers and dealers in Lumber, Lath, etc., 5 Carter st.

FISHER, WILSON & CO., wholesale lumber dealers (pine & hard wood), rough and dressed lumber, timber, lath, shingles, etc. 47 Central Way

KRAUSE, C. A., & SON, wholesale and retail dealers in lumber. Yards cor. Superior and Wason and 281 Merwin streets.

Cleveland Business Directory.

Flue Cleaner.

CLEVELAND FLUE CLEANER M'F'G. CO. manufacturer of Aitchison & Doolittle's Patent Steam Flue Cleaner, 36 South Water Street.

Hardware and Iron.

BINGHAM, WM. & CO., Hardware, Iron, Nails and Metals, 148 and 150 Water street.

CLEVELAND ROLLING MILL CO., manuf'rs. of Steel and Iron Wire and Steel Tire.

WORTHINGTON, GEO. & CO., Hardware and Dealers in Metals. Water street.

Lime Manufacturers.

RUSSELL LIME CO., manufacturers of White Lime; also dealers in Plaster, Cement, etc. 85 Elm street.

Machinery and Boilers.

CLEVELAND STEAM FURNACE CO., Engines and Boilers, cor. Detroit and Center sts.

KRITCH, K. E. Metal Pattern Maker. Small machinery repaired. Lawn Mower sharpening a specialty. 42 South Water Street.

UNION MACHINE WORKS, Wason Street bet. St. Clair and Superior Sts., manfrs and agents of G. W. Clayton's Elevators for passengers and freight. General machinists & jobbers.

PANKHURST, T. J. & CO., Valley Machine Works, manufacturers of Machinists' Tools, &c. Fine lathes a specialty. 6 Champlain street.

Machinery Depot.

CLEVELAND MACHINERY DEPOT, (now National Machinery Depot.) The largest stock of New and Second-hand Engines, Boilers and Machinists' Tools. Shop and Warehouse corner Bond and Superior streets.

Mercantile Agency.

THE MERCANTILE AGENCY. R. G. Dun & Co. proprietors. 121 Superior street.

Oil Manufacturers.

AMERICAN LUBRICATING OIL CO., manufacturers of lubricating oils, 23 Euclid ave.

Paints and Oils.

MASTERS, J. N. jobber in Paints, Oils, Varnishes. Brushes, 34 Prospect st.

Pattern and Model Makers.

WHITTINGHAM, J. & C., Metal Pattern and Model makers. 52 Canal Street.

STAIR BUILDER.

PFEIL, CHAS, Stair Builder; Hard Wood Mantles and Office Railing. Works, 49 Cana street, Cleveland, Ohio.

JOHNSON & PURSER, Stair Builders, and manuf'rs of Mantels, Odd Pieces of Furniture, &c. 30 West street, up stairs.

Steel Stamps and Stencils.

FLEHARTY, J. H. & CO., Rubber Stamps, Seals, Stencils. 197 Superior street.

Tanners.

GAENSSLEN BROS., Tanners, and dealers in leather, oil and shoe findings. 80 Water-st.

Trunks and Valices.

FABER, J. manuf. Trunk, Traveling Bags and Ladies' Fine Satchels. Sample Trunks and Cases a Specialty. 56 Public Square.

Vessel Agents.

WEBB, H. J. & CO., Ship Brokers and Vessel agents. 17 & 18 Board of Trade Building. 122 Water Street.

Wood Carving.

HERKOMMER, J., Carver and Ornamenter in Composition. 225 Erie street.

Business Directory.

Akron, O.

AKRON IRON CO., manufacture best Common, Refined and Charcoal Iron.

CASCADE HOUSE, cor. Mill and Summit sts., near Depot. J. Downie, Prop.

MCNEIL, J. C., Steam Boilers, Heavy Sheet Iron Work. Repairing promptly executed.

PERKINS, C. E., dealer in Agricultural Implements, machinery, and Manufacturers' Ag'nt

TAPLIN, RICE & CO., manuf'rs. of Stoves and Hollow Ware, dealers in Tinners' Stock, etc.

WEBSTER, CAMP & LANE MACHINE CO., Founders and Machinists, 12 Main street.

Alliance, O.

ARLINGTON HOUSE, cor. Main and Liberty Streets. Centrally located. Sample Room for Commercial Travellers. H. S. Adams, proprietor

ALLIANCE INDUSTRIAL WORKS, E. Fawcett & Son, Proprietors, manufacturers of portable and stationary steam engines and circular saw mills.

MCFARLAND, J. W. Engine and Machine Builder, and General Machine Jobbing

Canton, O.

DIEBOLD SAFE & LOCK CO., manuf'rs. Safes, Locks, Bank and Safe Deposit Works.

NOVELTY IRON WORKS, Mill work, Shafting, engines, Imperial job printing press, etc

NEW AMERICAN HOUSE, Canton. Fred. Hipp, Prop.

EBERSOLE & KAILEY, Machine and Jobbing Shops. Gearing for Patterns or Machinery a specialty. Models of all kinds made & repaired.

Business Directory.

Cuyahoga Falls, O.

THOMAS BROTHERS, manfrs of Ohio Stone Ware. Cuyahoga Falls Stone Ware Factory, cor. Main and Broad streets,

TURNER, VAUGHN & TAYLOR, manufacture engines, presses and grinding machinery for clay; also paper, chain, wire and flour mill machinery. Send for Circulars and price list.

Columbus, O.

PAT. ADJUSTABLE WINDOW CURTAIN Cornice, manufactured by Strader's Curtain Cornice Works.

ROYCE & PULLING manufrs of Patent Steam Pumps for all purposes. Store room 30 High street. Works Nos. 5 and 7 Scioto street.

COLUMBUS MACHINE CO. manfrs. of Blowing, Stationary and Portable Engines, Brass and Iron Castings. West End Nat. Road Bridge.

REYNOLDS BROS., manufacturers of hand-cut Files and Rasps. Old files re-cut. Send for Price List.

CITY BOILER WORKS, manfrs of Stationary, Portable and Locomotive Steam Boilers. All work warranted Borger Bros. & Co.

MURRAY, HAYDEN & CO., manfrs of Malleable Iron. Cor. Randolph & West streets.

RAGAN W. H. & CO., manfrs of Doors, Sash and Blinds, Mouldings, Casings, Balusters, Newels, Hand-railing, and Builders' Mill Work of every description. Cor. West Broad & Center.

Canal Dover, O.

HECKMAN, E., manufr. and dealer in harness leather, upper, kipp and calf. Also, manufacturer & dealer in prime English Dairy cheese. Highest market cash price paid for hides.

Garrettsville, O.

UDALL & NILES Foundry and Machine Shop. General repairing and jobbing on short notice

Geneva, O.

THE ENTERPRISE MACHINE CO., L. L. Crane, Pres't, manfrs of Machinists' Tools and Machinery. Gear Cutting a specialty.

Lima, O.

LIMA HOUSE, centrally located; telegraph office in the house. J. Goldsmith, Prop.

Massillon, O.

TREMONT HOUSE, Jas. M. Clark, proprietor. Terms $1.50 per day. Good sample room for Commercial Travellers.

CITY CARRIAGE WORKS, P. H. Young, prop. manfact'r of Carriages, Phætons and Spring Wagons. Work warranted. Cor. Tremont & Erie.

Painesville, O.

NORTH AMERICAN CUTLERY CO., m'fr's of Steel Shears and Scissors—best quality.

Ravenna, O.

THOMPSON, T. F., dealer in Agricultural Implements, farm machinery, hardware, seeds, fertilizers, &c. Cor. Main and Prospect sts.

BALDWIN, D. L. & SON, Contractors & Builders and manfrs of all kinds of Moulding, flooring, siding, &c. Rip, Band and Scroll Sawing.

Steubenville, O.

FIELDING, RICHARD, proprietor Commercial Hotel, 222 Market street. Comfortable rooms and beds. Sample rooms for Commercial men.

Sandusky, O.

SANDUSKY WHEEL CO. manfrs. of Sarven Patent Wheels, Carriage Bodies and Seats, Plain Wood Hub Wheels, Banded Hub Wheels, Jacobs' Patent Neck Yokes.

WOOLWORTH, JAMES, manfr. of Axe, Pick, Sledge and Auger Handles, Hickory Whip Stocks, &c. Established in 1855.

FULTON MACHINE WORKS & FOUNDRY, Barney & Kirby, proprietors, manfrs. of Stationary and Portable Engines and Boilers, Rolling Mill Machinery, Circular Saw Mills, etc.

Toledo, O.

BAKER, HERBERT, Machine Shop and Iron Foundry. 98 and 100 Erie street.

TOLEDO FOUNDRY AND MACHINE CO. builders of Steam Engines, Circular Saw Mills and all kinds machinery. Water St., cor. Cherry

RUSSELL IRON WORKS, mnfrs. of Architectural Iron Work, castings, pulleys, shafting and steam bending machinery. Cor. Water and Lagrange streets

STANDARD SAW WORKS, H. Bartley, manufacturer and dealer in Saws of every description All kinds of Springs made from Sheet Steel. Reaper, Hay Knives Truss Springs, &c. made to order. 92 St. Clair Street.

UNION Wooden Ware Manufacturing Co. manufacture Sewing machine, washboards, children's wagons, carts, wheelbarrows, sleds, kitchen wooden ware, &c.

HEPBURN BROTHERS, proprie. Union Boat Works. Boats of all kinds made to order. For sale or rent. Water Street foot of Cherry.

THE PUREST AND BEST BONE DUST. Send for Circular. S H. Morgan & Co.

Youngstown, O.

BEIL, EDWIN & SON, manuf. of Nail Kegs, Pat. coiled hoops, slack barrel and keg heading and oil barrel stock.

DINGLEDY, G. H. dealer in rough and dressed Lumber, Shingles and Lath.

MORTON HOUSE, formerly Maitland House, James Morton, Prop.

TOD HOUSE, cor. Diamond and Market streets. Henkel & Bowman, Props.

Zanesville, O.

KIRK HOUSE, William Kirk, proprietor. $1.50 per day.

Business Directory.

Erie, Pa.

ERIE STEAM BENDING WORKS. H. G. Fink, prop'r, manufacturer of Bent Felloes, poles, snafts, bob runners, etc. Cor. 12th & Cherry.

GUNNISON, A. B., wholesale manufacturer of Wood Pumps. 233 East Twenty-second St.

BALL ENGINE CO., limited, manufacturers of Automatic Engines of 15 to 30 horse power

NOBLE SEWING MACHINE CO. manfrs of the New Noble Sewing Machine. Send for circulars and prices.

A. B. FEUGEMAKER & CO. Church Organ builders. Descriptive catalogue furnished on application.

Meadville, Pa.

CURRY & CO. general jobbers in Castings of all kinds.

MYERS & GREEN, Founders, general jobbers in Castings of all kinds. Orders filled on short notice.

SCHAUWEKER, F., proprietor of French Creek Tannery, manufr of leather belting, harness fair line and skirting leather.

Oil City, Pa.

REID, JOS. Machinist, steam engine and pump repairing. Brass and iron castings, light and heavy, made on short notice.

Sandy Lake, Pa.

EBERMANN, W. S. & SONS, manfrs. of the celebrated Ebermann Boiler Feeder. Send for Circulars and Price List.

Titusville, Pa.

FOSTER & McKAY, dealers in boilers and engines, tubing, casing, old iron, rope, and all kinds of metals. Washington street, nr. Railroad.

Rochester, Pa,

OLIVE STOVE WORKS, (limited) manufacturers of Stoves and Hollow Ware.

Pittsburgh, Pa.

PRINTING PRESSES. W. A. Bunting, manufacturers' agent. Printers supplies, type, cards. 42½ Sixth Street. [Up stairs.]

Wheeling, W. Va.

EXCELSIOR MACHINE WORKS, Redman & Co., general machinists and manufacturers of Marine and Stationary Engines, Hangers, Pulleys, Shafting, &c. Cor. 18th & Chapline streets.

Olean, N. Y.

MYRICK BROS. & CO., manufact'rs Engines and Boilers, oil drilling tools, rig irons, etc.

Rochester, N. Y.

GOWE, JNO. N., mfrs. of Specialties, such as Machine forging, bridge bolts and trusses, railroad switches, spike, mall, chisels, &c.

ELEVATORS for Hotels, Factories and Private Houses. J. S. GRAHAM & CO.

KELLY, PETER, Boiler Maker, Mill street, cor. Furnace. Sheet iron work made to order

WOOD-WORKING MACHINERY. Send for Catalogue. J. S. GRAHAM & CO.

KINGSBURY, G. J., Cracker and Oven Machinery Works. Shawmut Building, Mill St,

WISEMAN, Albine, manufacturer of all kinds of Shoemakers' Tools. 117 North Water St.

ULSCHT & LINN mfrs of Wood Lathes, Engraving Machinery, &c 131 N. Water street

RAZOR STROPS. Sole mfrs. of all kinds of Razor Strops. Uischt, Linn & Co. 131 N. Water

Buffalo, N. Y.

SANDS, PAUL, Marine and Stationary Steam Engine Works mfr. of drilling machines, foot and power lathes. 70 Columbia street.

EMPIRE STATE MF'G CO., O. F. Swift, prop'r, manfr of Fluters, Sad Irons, Spun Copper & Half Copper Tea Kettles. Washington, cor. Ohio

WHITE, L. & I. J. manfrs of Coopers' Tools, Carpenters Tools, Draw Shaves, Cleavers Choppers, Ship Tools, &c. 312 Exchange street.

THE BUFFALO NUT AND BOLT CO. [Limited.] Manufrs. of Hot Pressed Nuts, Bolts, Washers, Rivets, &c. No. 226 Ohio Street.

Louisville, Ky.

HAIGHT, ROBERT. Gold, Silver and Nickel Plating and Brass Finishing Shop. Car Trimmings and Steamboat work a specialty. 1 West Market street

Union City, Ind.

LAMBERT, J. W. & CO., mfrs of fork, rake, hoe and broom handles; spokes, hubs, whiffletrees, yokes, plow-rounds, &c. Correspondence solicited.

H. C. CHANDLER
Engraver on Wood
Cor. Circle & Market Sts.
JOURNAL BUILDING INDIANAPOLIS, IND.

CLEVELAND
ELECTROTYPE
FOUNDRY
55 FRANKFORT STREET 55
CLEVELAND, O.

TRAVELERS' REGISTER.

Lake Shore & Michigan Southern.

EAST BOUND TRAINS.

	Arrive.	Depart.
No. 20 Limited Express	1:35 A.M	*1.50 A.M
No. 6 Atlantic Express	*7:05	*7 30
No. 10 Buffalo Accom	11:00	11.15
No. 8 C. & St. L. Exp	*2:25 P.M	*2.55 P.M
No. 4 Special N. Y. Exp	10:10	10.35
No. 2 San. Div. Accom.	10:12	
No. 12 Conneaut Accom.		4.50
Nottigham Accommodation (Sundays only)	10.05 A.M / 4.45 P.M	9.00 A.M / 2.15 P.M
No. 18 Elyria Accom.	8.50 A.M	

WEST BOUND TRAINS.

	Arrive	Depart.
No. 13 Mich. Accom.		6.40 A.M
No. 1 Special Chicago Ex.	*6 35 A.M	7.00
No. 3 Toledo Express	1.25 P.M	3.30 P.M
No. 21 St. Louis Express	*1.40	*2.05
No. 5 Pacific Express	*7.05	*7.35
No. 11 Conneaut Accom.	8.40 A.M	
No. 19 Pt. Clinton Accom.		5.00
No. 7 Michigan Exp.	*2.50 A.M	*3.05 A.M
No. 17 N.Y. & Chi. Ex.	11.43 P.M	11.53 P.M

Cleveland, Columbus, Cincinnati & Indianapolis.

ARRIVALS.

No. 2 Col. & Cin. & Ind'polis Ex.	*7 10 A.M
No. 8 C. T.V. & W. & Clev Accom	10 30
No. 12 St. Louis & New York Exp.	3 00 P.M
No. 4 Special Cin. & New York Exp.	3 20
No. 10 Wheeling & Cleveland Exp.	8 25
No. 6 Indianapolis & Columbus Exp.	10 20

DEPARTURES.

No. 1 Cincinnati & Columbus Exp.	8 00 A.M
No. 11 Cleve, Indianap. & Wheel'g Ex.	7 15
No. 3 St. Louis & Cincinnati Ex.	*2 00 P.M
No. 5 Night Express.	*7 25
No. 7 C T V & W. & Col. Accom	4 00

Cleveland, Tuscarawas Valley & Wheeling.

ARRIVALS.

No. 4 Wheeling & Cleve'd Exp	8 25 P.M
No. 2 Uhrichsville Accom	10 30 A.M

DEPARTURES.

No. 1 Wheeling & Cleve'd Exp	7 15 A.M
No. 3 Uhrichsville Accom	4 00 P.M

New York, Pennsylvania & Ohio.

ARRIVALS.

No. 7 Mahoning Valley Accommo.	10 55 A M
No. 3 New York Express,	*7 00 P M
No. 1 New York Express,	*6 50 A M
No. 3 Pittsburgh Express,	*7 00 P.M
No 5 Pittsburgh Express,	3 10
New York Express	3 10
No. 9 Youngstown and Pitts. Local	10 15

DEPARTURES.

No. 12 New York Express,	*7 10 A.M
No. 4 Youngstown Local,	11 15
No. 8 Mahoning Accommodation,	4 25 P.M
No. 2 New York Express,	10 45
No. 12 Pittsburgh Express,	*7 10 A.M
No. 6 Pittsburgh & Main Line Express	2 30 P.M

Cleveland & Pittsburgh.

DEPARTURES.	ARRIVE.
Mail	8 50 A.M / 1 15 P.M
Express	1 50 P.M / 7 25
Alliance Accommodation	8 45 / 10 10 A.M
Ravenna Accommodation	5 30 / 8 35
Night Express	†11 40 P.M / 6 30 A.M

† Night Express runs daily, except Saturday, by way of Wellsville, and on Saturday by way of Alliance.

Valley Railway.

ARRIVE.		DEPARTURES.	
No. 2 Accom.	10 15 A.M	No. 1 Mail	*8 20 A.M
No. 6 Express	1 35 P.M	No. 3 Accom.	4 05 P.M
No. 4 Mail	6 30 P.M	No. 5 Exp.	6 30

Trains leave from Depot foot of South Water Street.

Connotton Valley Railway.

Arrive.		Depart.	
No. 1	10 05 A.M	No. 4	4 00 P.M
No. 3	7 15 P.M	No. 2	8 50 A.M

All trains arrive and leave depot corner Commercial and Fifth Streets.

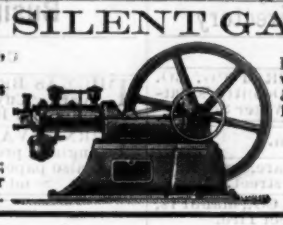
NEW OTTO SILENT GAS ENGINE.

Working without Boiler, Steam, Coal, Ashes or Attendance.

Started instantly by a Match, it gives full power immediately.

When stopped all expense ceases.

No explosions; no fires nor cinders; no gauges; no pumps; no engineer or other attendant while running.



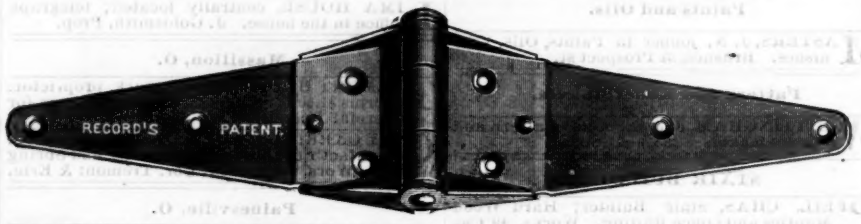
Unsurpassed in every respect for hoisting in warehouses, printing, ventilating, running small shops, &c., 2, 4 and 7 H.P. and upwards. Built by Schleicher, Schumm & Co., PHILADELPHIA.

ALBERT FISHER, Agent for Ohio, 48 Merwin Street, Cleveland, O.

WEST POINT BOILER WORKS.
ESTABLISHED 1835.
Removed from 13 Water to Corner 23d and Smallman Streets, PITTSBURGH, PA.
FIRST PREMIUM STEAM
BOILERS,
Stills, Tanks and Sheet Iron Work
of all descriptions made to order on short notice. Have on hand a large stock
New and Good Second Hand Boilers.
REPAIRING DONE PROMPTLY.
R. MUNROE.

Dayton Malleable Iron Co.,
Manufacturers of
Air Furnace Iron.
A full line of Carriage and Plow Hardware kept in stock.
Catalogues for the Trade.

Record's Patent Hinge.



THE MAIN PART of this Hinge is of the same style as the ordinary heavy strap. The joint is strengthened by FLANGED SUPPORTS, made of extra quality of iron, spanning the entire width of each leaf, firmly riveted to the back of the hinge. The pintle of the hinge passes through the ear of the flange, thus adding greatly to its strength. Also, by the additional thickness of iron, greatly STIFFENING THE HINGE where most liable to bend, and secure against breaking where the greatest part of the STRAIN COMES. As the straps of the hinge are bent down, forming an offset for the reception of the supports, the hinge is smooth or flat on the back, same as the ordinary hinge. These hinges are neat in appearance, and owing to their great strength admitting of smaller sizes being used than heretofore, renders them the most economical, as well as the most desirable hinges made. They are applied the same as ordinary hinges.

PRICES PER DOZEN PAIRS.

5-inch, $2.00. 6-inch, $2.80. 8-inch, $4.40. 10-inch, $6.60. 12-inch, $9.40.

Also manufacturers of
Record's Tight Butter Packages and Sap Spouts.
RECORD MAN'F'G CO., Conneaut, O.

IRON ROOFING. **MOSER & THOMPSON,** SIDING
MANUFACTURERS
Corrugated Iron Siding for Grain Elevators a Specialty.
Iron Ore Paints.
29, 31 & 33 River Street,
CLEVELAND, OHIO.
Send for Circular and Price List, mentioning this paper.

GREAT WESTERN OIL WORKS.
ILLUMINATING OILS, LUBRICATING OILS,
Naphtha & Gasoline.
Orders solicited in Bulk, Barrels or Cases.
Scofield, Shurmer & Teagle,

J. C. McNEIL,
PROPRIETOR OF
Akron Boiler Works,
Manufacturer of
BOILERS OF ALL KINDS.
Also Heavy Sheet and Boiler Iron Work.
SPECIALTIES:
Rotary Globe Bleach Boilers, and McNeil's Patent Magazine Heating Boilers.
Repairing Promptly Attended To
Shop 503 South Broadway, Opposite Buckeye Works.
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WOOD ENGRAVER ON WOOD
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JOYFUL News for Boys and Girls!! Young and Old!! A NEW INVENTION just patented for them, for Home use! Fret and Scroll Sawing, Turning, Boring, Drilling, Grinding, Polishing, Screw Cutting. Price $5 to $50. Send 6 cents for 100 pages.
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$5 STANDARD ELECTRIC BELT
THAT FAMOUS STANDARD $5 ELECTRIC BELT
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The IRWIN & KEBER
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MANUFACTURED BY THE
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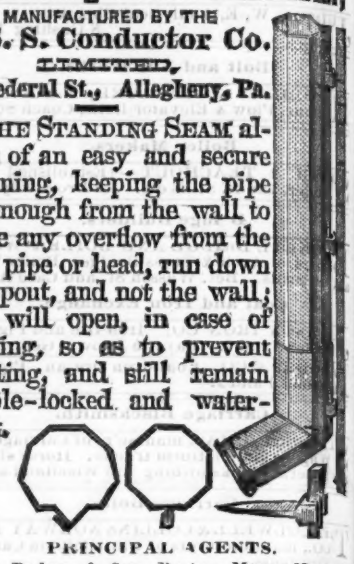
THE STANDING SEAM allows of an easy and secure fastening, keeping the pipe far enough from the wall to make any overflow from the eave pipe or head, run down the spout, and not the wall; and will open, in case of freezing, so as to prevent bursting, and still remain double-locked and water-tight.



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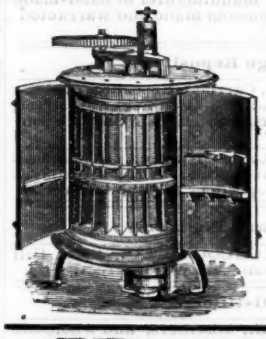

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Bran Dusters, Brushes and Wire Cloth furnished to order at Lowest Prices.

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$85.00 PAYS TUITION, BOARD, &C.
For 12 weeks at the Toledo Business College. For Circulars containing full information and specimens Penmanship, address
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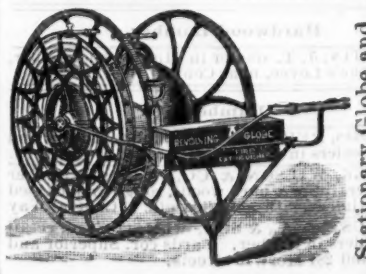

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Cleveland to New York,

VIA THE

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For New York, Boston and the East. The shortest and quickest route to Pittsburgh, Washington, Baltimore and the Southeast

Until further notice trains will leave the new Central Depot, South Water Street and Viaduct, as follows:

7:10A.M. LIGHTNING EXPRESS, (daily,) sleeping and hotel coaches from Leavittsburg, 8:55 a.m. To New York, Albany and Boston without change. Parlor car, Cleveland to Salamanca. Arrives at Meadville 11:20 a.m., (dinner); Franklin, 12:33 p.m.; Oil City, 1:00 p.m.; Corry, 1:00 p.m.; Jamestown, (Lake Chatauqua) 1:57 p.m.; Buffalo, 6:15 p.m.; Rochester, 8:30 p.m.; Hornellsville, 6:40 p.m., (supper); Corning, 8:25 p.m.; Elmira, 8:57 p.m.; Binghampton, 10:58 p.m.; Albany, 6:00 a.m.; Boston, 2:45 p.m.; arriving at New York, 6:50 a.m.

10:45 P.M. NIGHT EXPRESS, (daily except Sunday), Sleeping Coach from Leavittsburg to New York without change. Arrives at Youngstown 1:45 a.m.; Meadville, 3:50 a.m.; Corry, 5:20 a.m.; Jamestown, 6:22 a.m.; Buffalo, 9:45 a.m.; Rochester, 1:10 p.m.; Hornellsville, 11:20 a.m.; Corning, 12:53 p.m.; Elmira, 1:21 p.m.; Binghampton, 2:50 p.m.; New York, 9:25 p.m.

2:30 P.M. PITTSBURGH EXPRESS,—daily, through without change. Parlor Car, Cleveland to Pittsburgh, arrives at Youngstown, 5:00 p.m.; Pittsburgh, 8:25 p.m.; Washington, 7:30 a.m.; Baltimore, 8:15 a.m.; via Sharon and Sharpsville to Meadville 7:40 p.m.

4:25 P.M. MAHONING ACCOMMODATION, stopping at all way stations. Arrives at Youngstown, 7:30 p.m; Sharon, 8:30 p.m; Sharpsville 8:40 p.m; connects at Leavittsburg with train No. 20 for Meadville and intermediate points, arrives at Meadville, 11:05 p.m.

7:10 A.M. PITTSBURGH EXPRESS,—(daily) through without change. Arrives at Youngstown, 10:00 a.m.; Sharon, 10:55 a.m.; Sharpsville, 11:05 a.m.; Pittsburgh, 1:08 p.m. Returning, leave Pittsburgh, 4:48 a.m., 8:55 a.m., and 1:18 p.m. and 4:20 p.m.

11:15 A.M. YOUNGSTOWN & PITTSBURGH Accommodation, stopping at all Way Stations, arriving at Youngstown 2:10 p.m.; Pittsburgh, 6:10 p.m. Trains arrive at Cleveland, 6:50 a.m., 10:55 a.m. 3:10, p.m. 7:00 p.m., and 10:15 p.m.

☞ This is the only route by which passengers can reach Corry, Elmira, Binghampton, New York City, and intermediate points WITHOUT CHANGE. No change to Boston and New England cities.

Baggage Checked Through to All Points East

☞ Through Tickets and information regarding the route can be obtained at the Union Ticket Office, corner Bank and Superior streets; at office 131 Bank street, and at new Depot of New York, Pennsylvania and Ohio Railway, South Water street and Viaduct, Cleveland.

WM. B. SHATTUC,
Gen. Pass'r. Agt., Cleveland, Ohio.
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EAST AND WEST.

No Midnight Changes!
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Connections in Union Depots for all Points.

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Elegant, easy riding, Day Coaches,
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Elegant Horton Reclining Chair Cars, between Lake Erie (Cleveland,) **and the Mississippi River,** (St. Louis) **FREE.**

Model Hotel cars attached to Express Trains, which together with a track and road bed of known excellence, you are assured Comfort and Safety with

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Consult your best interests by asking for and securing a Ticket via the Bee Line. For Maps, Time Tables, and other information, call on

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Contains the Latest News from Mines, having correspondents in all the principal mining camps. Latest mining stock quotations from San Francisco, Boston, Philadelphia and New York markets; also special reports and prices of the IRON. and COAL market.

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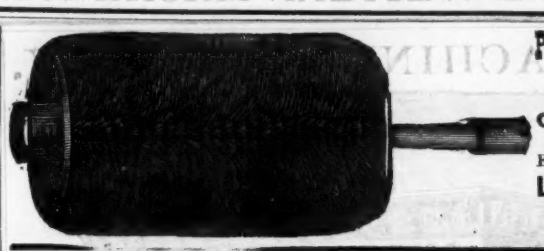
MFRS. OF HAND & POWER BOLT & PIPE CUTTERS, BOLT CUTTERS, BOLT HEADERS, HOT & COLD PRESSED NUT MACHINERY, TAPS & DIES &c. SEND FOR CIR. CLEVELAND, O.



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Best in the Market.
Made any size required.
Combines the properties of a Scraper and Brush.
Full stock always on hand.
L. B. Flanders Machine Works
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STEEL CASTINGS

FROM 1-4 TO 15,000 LBS. WEIGHT. TRUE TO PATTERN, sound and solid, superior in strength, toughness and durability to iron forgings in any position, or for any service whatever. Gearing of all kinds, Shoes, Dies, Hammerheads, Crossheads, Rockers and Piston Heads for Locomotives, etc. 15,000 Crank Shafts and 10,000 Gear Wheels of this Steel now running prove its superiority over other Steel Castings. CRANK SHAFTS, CROSSHEADS & GEARING SPECIALTIES. Circulars and Price Lists free.

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Manufactured by the
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H. G. WORMER & CO, Agents,
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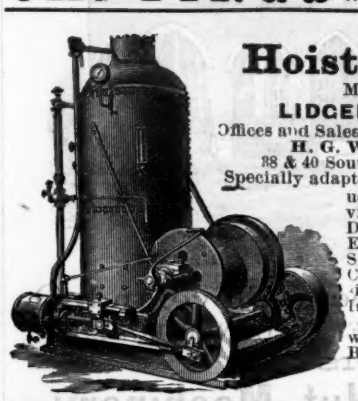

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Black Birch Carriage, Wagon and
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Sizes from 3½x6½ to 18x22.
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For Machinery and Rolling Mills.
Car Wheels
all sizes and kinds, with and without Axles.
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Nos. 9, 11, and 13 Winter Street.
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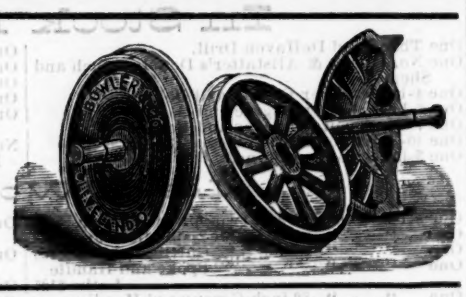

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WATT'S IMPROVED SELF-OILING CAR WHEELS,
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Also builders of the Whitwell Ovens
Plans and Detail Drawings of all kinds of work furnished on short notice.
Agents for A. S. Cameron's Pumps.

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The strongest, safest and most economical explosive KNOWN TO THE ARTS.

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No. 2—For medium hard rock, lime quarries, sand stone, stumps, etc.

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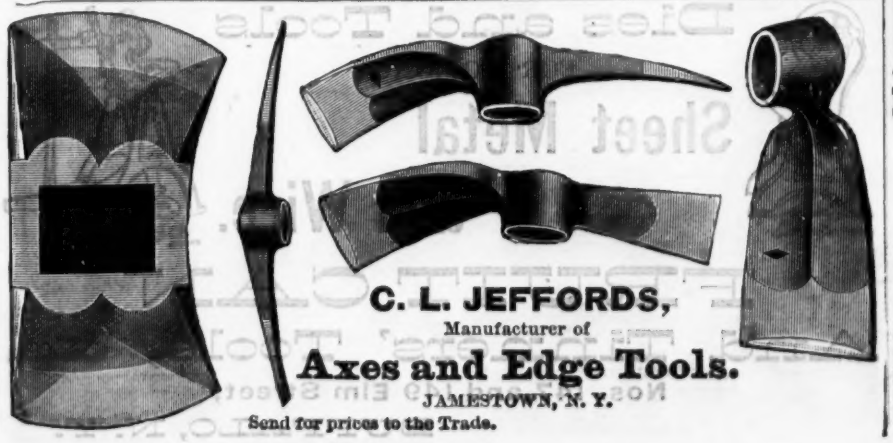


C. L. JEFFORDS,
Manufacturer of
Axes and Edge Tools.
JAMESTOWN, N. Y.
Send for prices to the Trade.

CLEVELAND & PITTSBURGH RAILROAD.

Trains leave and arrive daily, (Sunday excepted,) at the points named below, as follows:

MAIN LINE—GOING WEST.

	Western Expr'ss.	Mail Expr'ss.	Fast Line.	Accom.
Leave Pittsburgh	7 30 a.m.	2 00 pm	11 50 pm	.....
Allegheny	7 40	2 10	12 00 am	.....
Arrive Rochester	8 23	3 00	12 50	.....
Beaver	8 30	3 05	12 55	.....
E. Liverpool	9 08	3 37	1 37	.....
Wellsville	9 18	3 47	1 50	.....
Salineville	9 57	4 24	2 33	.....
Bayard	10 34	5 02	3 21	.....
Alliance	11 05	5 25	3 55 am	.....
Leave Alliance	11 10	5 25	4 05	7 30 am
Arrive Ravenna	11 48	5 50	4 47	8 15
Hudson	12 13 p.m.	6 23	5 15	8 50
Cleveland	1 15 p.m.	7 25 pm	6 30 am	10 10 am

Accommodation train leaves Ravenna at 6.45 a.m., arrives Hudson 7.15 a.m., Cleveland 8.35 a.m.

☞ Mail Express runs through Parlor Car, Fast Line and Western Express through Sleeping Car, Pittsburgh to Cleveland.

NOTE.—Fast Line leaves Pittsburgh Sunday nights, but not on Saturday nights.

MAIN LINE—GOING EAST.

	Pittsb'g Expr'ss.	Fast Line.	Day Expr'ss.	Accom.
Leave Cleveland	8 00 am	1 50 pm	11 40 pm	3 45 pm
Arrive Hudson	9 05	2 50	12 50 am	4 55
Ravenna	9 37	3 17	1 18	5 30
Alliance	10 20	3 53	2 05	6 20 pm
Bayard	10 54	4 16	2 49	.....
Salineville	11 40	4 51	3 40	.....
Wellsville	12 20 pm	5 20	4 35	.....
E. Liverpool	12 54	5 44	4 57	.....
Beaver	1 30	6 17	5 47	.....
Rochester	1 35	6 22	5 52	.....
Allegheny	2 30	7 05	6 45 am	.....
Pittsburgh	2 40	7 15	6 55	.....
Harrisburg	.....	3 50 am	4 00 pm	.....
Baltimore	.....	7 30	7 20	.....
Washington	.....	9 02	8 47	.....
Philadelphia	.....	7 20	7 35	.....
New York	.....	10 25	10 35	.....
Boston	.....	8 00 pm	.....	.....

Accommodation train leaves Cleveland Union Depot at 5.30 p.m., arrives Hudson 6.50 p.m., Ravenna 7 20 p.m.

All trains connect at Yellow Creek for Wheeling and Bellaire.

☞ Pittsburgh Express runs a Parlor Car Cleveland to Pittsburgh. Fast line runs Through Sleeper to New York. Day Express runs Through Sleeper to Pittsburgh.

TUSCARAWAS BRANCH.

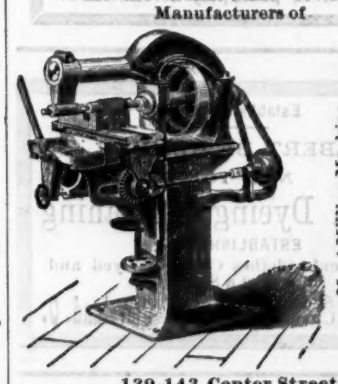
Trains leave Bayard at 11.00 a.m. and 5.10 p.m. arrive Minerva 11.08 p.m and 5 20 p.m : arrive Dover 12.18 p.m. and 7.15 p.m., New Philadelphia 12.30 p.m. and 7.30 p m. Returning leave New Philadelphia at 7.00 a.m. and 2.05 p.m., Dover at 7.30 a.m. and 2.15 p m., Minerva at 9 45 a.m. and 3 23 p m., Bayard at 10.00 a.m and 3.33 p.m.

All trains daily except Sunday.

D. W. CALDWELL, General Manager. E. A. FORD, Gen'l Pass. & Tkt. Agt. Pittsburgh, Pa.

E. E. GARVIN & CO.

Manufacturers of



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No. 4 Milling Machine.

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☞ Send for Illustrated Catalogue.

SAFETY STEAM, WATER, & HAND POWER
GIVE HATCH SIZE & ELEVATION OF BUILDING, & SEND FOR ILLUSTRATED CIRCULAR.
ELEVATORS.
C. H. MITCHELL & CO.
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MEAD'S IMPROVED PATENT DISINTEGRATER

For disintegrating, granulating or grinding without friction all kinds of material. It requires less power and grinds faster than any machine in the market. Is strong and simple; not liable to get out of order; no annoyance to workman from dust, and is the best machine in the market for grinding sugar, glue, sumac or drugs. Descriptive pamphlets will be sent free on application to MEAD & CO., 32 Atwater street, DETROIT, MICH.

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E. C. PECKHAM,
Manufacturer of all kinds of
CAST STEEL SAWS.
Repairing promptly attended to. Thin Planer Knives a specialty. Also manufacturer and jobber of FILES. Old Files Re-Cut. 6 St Clair street, TOLEDO, O.

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Every description of
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GEORCE MITTINGER,
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In Brass, Copper, Tin, Zinc, German Silver, &c.
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Also Manufacturer of the "Star Cuspador."

Estimates and Specifications furnished free.
JOHN E. CHAFER,
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Practical Steam Fitter.
LOW PRESSURE A SPECIALTY.
Men sent to all parts of the country, and no boys sent to do a mechanic's work.
All Orders promptly attended to.

Established 1866.
ALBERT BICHLMYER,
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Steam Dyeing & Cleaning
ESTABLISHMENT.
Gentlemen's Clothes Cleaned, Dyed and Repaired a Specialty.
Office, 119 Seneca Street,
Works, 31 Champlain Street
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Manufacturer of
Elevator Bucket & Chain Belting
For elevating, conveying and driving purposes.
From 64 to 68 Columbia Street,
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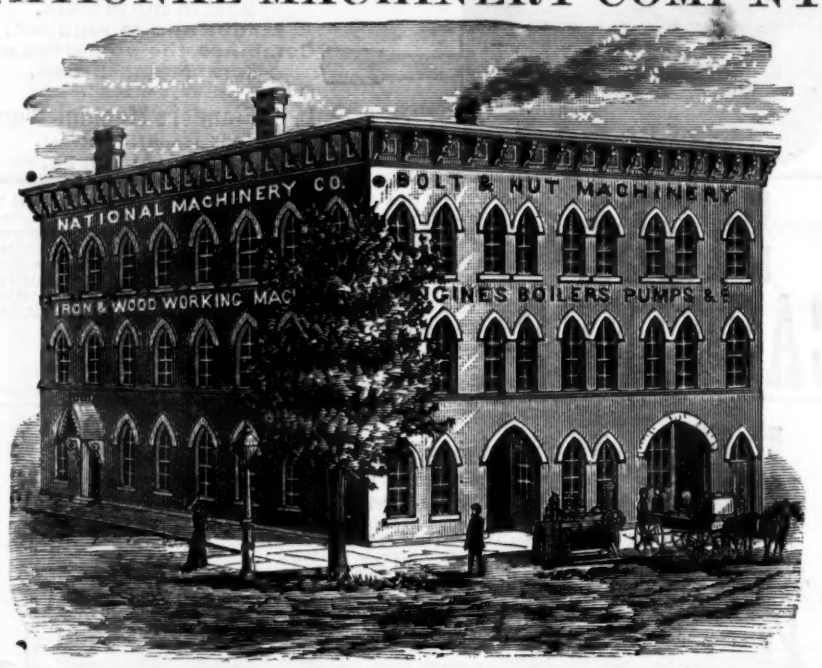
NERVOUS and Debilitating diseases a thirty years' specialty; the result of treatment exhibiting irrefragably how enfeebled health and vitality arising from enervating influences, ove taxation, etc., may be re-established and all impediments removed. The remedies adopted are such that beneficial results become manifest immediately. Average duration of treatment necessary for restoration, forty days. "Treatise and Form of Correspondence" for patient's guidance, sent in plain envelope on receipt of two cent stamps, but where convenient *visit preferred*. Separate consulting rooms. Hours 9 A. M. to 9 P. M.
Call, or address,
DR. CLEGG
CLEVELAND, OHIO.

NATIONAL MACHINERY COMP'NY.



Cor. Bond & Rockwell Streets, Cleveland, O.
SALESROOM—384 SUPERIOR STREET, CORNER BOND.
Manufacturers of
"National" Bolt and Nut Machinery,
Agents and Stock kept of Pratt & Whitney's Screw Cutting Tools, Taps, Dies, &c. Agents for J. A. White's, Levi Houston's and J. S. Graham & Co.'s Wood Working Machinery.
STOCK KEPT OF IRON AND WOOD WORKING MACHINERY,
Boilers & Engines.

In Stock for Sale:

One Thorn and DeHaven Drill.
One No. 7 Long & Allstatter's Double Punch and Shears,
One 4-horse power Engine and Boiler.
One 6-horse power Engine and Boiler
One 7-horse power Engine and Boiler.
One 10-horse power Engine and Boiler.
One 5-horse power Engine.
One 8-horse power Engine.
One 12-horse power Engine.
One 25-horse power Engine. New.
One 30-horse power Engine. New.
One 35-horse power Engine. And several others all in stock.
New and Second Hand Belting, Pulleys, 2 Water Motors, &c., &c.

List of Wood Tools.

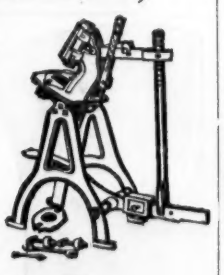
One second-hand Frank two-spindle Shaper, $65.
One " " wood frame 2-spindle Shaper, $35
One " " " " Cutting-off Saw, $80
One " " " " Spoke and Handle Lathe $125
One " " 22 inch Greenwood Heading Planer, $125
One " " Ellis Blind Slat Tenoner.
One " " 24-inch Ball & Co., Planer and Matcher.
One " " Power Rod and Dowell machine
One " " Fay & Co. No. 1 Railway Cut-off Saw.
Two " " Sandpaper Drums.
One second-hand Dimension Planer, 24-inches, with Feed attachment.
One " " wood frame swing Cut-off Saw and Table.
One " " Slotting machine.
One " " Thorn & Dehaven Drill.
Two " " Saw Tables.
One wood frame 6 inch Sticker.
Large lot second-hand Trenton Vises.
Large lot second-hand Anvils.
One Fay & Co. Agricultural Morticer, with boring attachment.
One Fay & Co. iron frame Tenoning machine, double heads.

Having moved our Salesroom to the large room previously occupied by the Wilson Sewing Machine Company, we are able to carry a very fine line of Wood Working Machinery and other Tools.

Glazed Windows.
CLEVELAND WINDOW GLASS CO.
For Doors, Sash, Blinds and Windows,
American, French & Plate Glass
73 Michigan Street and 132 Champlain Street,
Cleveland, Ohio.

NIAGARA STAMPING AND TOOL CO.,
Manufacturers of
Power and Foot Presses,

Dies and Tools
FOR WORKING
Sheet Metal and Wire.



FRUIT CAN
And Tinners' Tools, &c.
Nos. 147 and 149 Elm Street,
BUFFALO, N. Y.

Cleveland, Akron and Columbus RAILROAD.

Trains leave and arrive daily (Sundays excepted) at the points named below.

GOING SOUTH.

STATIONS. February 20, '82.	Miles	Mail and Expr 2	Thro' Pass'gr 4	Accom 6	Accom 8
		A.M.	P. M.	P. M.	
Cleveland		8.00	1.50	3.45	.....
Hudson (1)	0	9.15	3.00	5.05	.....
Cuyahoga Falls	8	9.32	3.18	5.23	.....
Akron (2)	14	9.47	3.33	5.36 / 5.50	.....
Clinton	27	10.17	4.04	6.23	.....
Warwick	28	10.23	4.10	6.31	.....
Marshallville	35	0.35	4.28	6.45	.....
Orrville (4)	39	10.51	4.43	7.03	.....
Fredricksburg	52	11.22	5.16	7.37	.....
Holmesville	56	11.34	5.28	7.52	A. M.
Millersburg	62	11.48	5.41	8.05	5.40
		P. M.			
Killbuck	68	12.02	5.55	.....	5.54
Black Creek	74	12.16	6.09	.....	6.08
Gann	82	12.41	6.35	.....	6.33 / 6.53
Danville	86	12.55	6.49	.....	7.07
Howard	91	1.05	6.59	.....	7.18
Gambier	95	1.15	7.11	.....	7.29
Mt. Vernon (5)	100	1.30	7.27	.....	7.43
Mt. Liberty	109	1.58	7.47	.....	7.59
Centerburg (6)	114	2.08	7.57	.....	8.19
Condit	120	2.22	8.11	.....	8.24
Sunbury	124	2.31	8.20	.....	8.35
Galena	126	2.36	8.26	.....	8.41
Westerville	133	2.51	8.42	.....	8.58
Columbus (7)	145	3.15	9.06	.....	9.23

GOING NORTH.

STATIONS. February 20, '82.		Thro' Pass'gr 1	Mail Expr 3	Accom 5	Accom 7
		A. M.	P. M.		P. M.
Columbus	0	6.00	12.15	.....	5.05
Westerville	12	6.25	12.41	.....	5.32
Galena	19	6.41	12.57	.....	5.49
Sunbury	21	6.47	1.03	.....	5.55
Condit	25	6.56	1.13	.....	6.06
Centerburg	31	7.10	1.27	.....	6.20
Mt. Liberty	36	7.20	1.38	.....	6.32
Mt. Vernon	45	7.43	2.02	.....	6.59
Gambier	50	7.55	2.15	.....	7.11
Howard	54	8.05	2.25	.....	7.23
Danville	59	8.15	2.36	.....	7.34
Gann	63	8.30	2.50	.....	7.49
Black Creek	71	8.56	3.15	.....	8.15
Killbuck	77	9.10	3.28	.....	8.29
				A. M.	
Millersburg	83	9.26	3.43	5.50	8.42
Holmesville	89	9.37	3.55	6.05	.....
Fredricksburg	93	9.49	4.06	6.18	.....
Orrville	106	10.23	4.43	6.50 / 7.10	.....
Marshallville	112	10.35	4.55	7.23	.....
Warwick	117	10.46	5.09	7.37	.....
Clinton	118	10.52	5.15	7.46	.....
Akron	131	11.28	5.47	8.22	.....
Cuyahoga Falls	137	11.41	6.00	8.35	.....
Hudson	145	12.00 M	6.18	8.55	.....
Cleveland		1.15 P M	7.25	10.10	.....

N. MONSARRAT, Gen'l Supt. Akron, O
E. T. AFFLECK, General Passenger Ag't, Columbus, O.

E. Fawcett. R. B. Fawcett.
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